REPORT

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Default Time-of-Use Pricing Pilot Interim Evaluation

Submitted to Southern California Edison

April 1, 2019

Principal authors:

Stephen George, Ph.D., Senior Vice President
Eric Bell, Ph.D., Principal
Aimee Savage, Consultant II
Tyler Lehman, Project Analyst II

CALMAC ID: SCE0434.01

Contents

Glossary of Acronyms

CARE	California Alternate Rates for Energy
CCA	Community Choice Aggregator
CPUC	California Public Utilities Commission
DiD	Difference-in-differences
E&O	Education and outreach
FERA	Family Electric Rate Assistance
IOU	Investor owned utility
ITT	Intention-to-treat
LPP	Level payment plan
ME&O	Marketing, education and outreach
OAT	Otherwise applicable tariff
RED	Randomized encouragement design
TOU	Time of use
WG	Working Group

1 Executive Summary

This document constitutes the interim evaluation report for Southern California Edison's, residential default time-of-use (TOU) pricing pilot. This pilot was implemented in response to California Public Utilities Commission (CPUC) Decision 15-07-001. A key objective of the pilot is to develop insights that will help guide SCE's approach to implementation of default TOU pricing for the majority of residential electricity customers and the CPUC's policy decisions regarding default pricing.

Findings from the first summer—June through September 2018—are documented in this report. This report also contains detailed background information on the pilot, describes the pilot design and the evaluation methodology used for analysis, discusses SCE's pilot implementation and treatments, and presents load impacts, bill impacts, and opt-out findings covering the 2018 summer period.

The pilot tested two different TOU rate options. Approximately 200,000 households were assigned to each of the TOU rates, and an additional 200,000 were retained in the study on the standard tiered rate to act as a control group for those who were placed on the new tariffs. After receiving multiple notifications regarding the fact that their rate will change if they did not take action by a certain date, customers had the option of opting out prior to the rate change and staying either on their otherwise applicable tariff or choosing an alternative rate plan other than the one they were to be defaulted on. If a customer took no action, they were placed on the default rate associated with their assigned group. The initial default notifications are described in detail in Section 2.2. These notifications included a rate analysis comparing each customer's bill based on the new TOU rate with their bill under the otherwise applicable tariff using historical customer data along with additional education and outreach (E&O) material.

1.1 Pilot Design & Evaluation

Evaluation of the default pilot focused on a number of important research objectives, including:

- SCE's **operational readiness** to default large numbers of customers onto TOU rates over a short time. Relevant metrics include call volume, billing exception processing, database capabilities, tracking systems, rate change and bill processing, system enhancements, and bill protection processing.

- The **impact of different marketing, education and outreach (ME&O) strategies** on awareness of rate options, opt-out rates, engagement with the TOU rate and customer perceptions while on a TOU rate. Specific ME&O options examined included variation in the type of structural bill information provided in conjunction with the default notifications, two messaging strategies, and different format and content for welcome package materials.

- The **average peak and off-peak change in energy usage** by customers enrolled on each default rate (referred to as rates 4 and 5 to reflect differences in the start time for the peak period, 4 PM versus 5 PM).

- The **bill impacts** for customers enrolled onto each rate.
- The **opt-out rate** for customers defaulted onto each rate under each notification treatment.
- The impact of options such as level payment plans (LPP) on **customer retention** on each rate as well as on load and bill impacts and customer perceptions while on their default TOU rate.

An assessment of operational readiness is not included in this report. Survey-related metrics such as awareness, customer satisfaction, and others have been obtained through two surveys and are reported elsewhere.

The pilot was structured as a randomized encouragement design (RED) experiment. With a RED, different randomly selected samples of customers are offered different experimental treatments (in this case, a TOU rate or different content or messaging in the recruitment materials) and another random group of customers is not offered anything (e.g., the control group). Some who are offered the treatment take it and some do not. Because each sample is a statistical clone of the other due to the random selection (especially in this case where sample sizes are quite large), comparing the behavior of the encouraged group with that of the control group allows for an unbiased assessment of the impact of the treatment. This analysis requires a two-step process in order to isolate the impact of the encouragement (e.g., the offer of a treatment) from the treatment itself, as explained more fully in Section 3.

Load and bill impacts were estimated for four different climate regions in SCE's service territory (hot, moderate, cool, and Climate Zone 10). For the moderate and cool climate regions, estimates were also made for two customer segments, CARE/FERA customers and non-CARE/FERA customers. CARE/FERA customers in the hot climate region and Climate Zone 10 were not allowed to be enrolled on TOU tariffs using default recruitment. As such, comparisons across the two hot and two more moderate regions not only reflect differences in climate but also differences in the mix of customers. Also, differences in load impacts across customer segments at the service territory level reflect not just differences across segments, but also differences in the mix of customers across climate regions for each segment. These differences must be kept in mind when making comparisons across segments and climate regions.

The difference in bills on the TOU rates compared with bills under the otherwise applicable tariff (OAT) are comprised of two components – differences due simply to the rates, holding behavior constant, and differences due to changes in behavior as a result of the difference in price signals. The first type of difference is known as a structural bill impact, and can be computed based on usage data prior to customers enrolling on the new rate. Because bill impacts can vary rather significantly across seasons, and since this report is based only on usage for the summer season, it does not present behavioral impacts or total bill impacts. Those will be presented after customers have been on the new tariffs for a full year. This report presents information on structural bill impacts for summer, winter and an entire year based on pretreatment data.

In addition to load and bill impacts, another important metric is customer opt-out rates. Comparisons of pre-enrollment opt-out rates across rate options are indicators of the relative

preferences of customers for each rate option and comparisons across notification content and messaging within a rate option can provide insights about the relative effectiveness of these notification alternatives. Comparisons across customer segments and climate regions reflect the influence of these factors on customer acceptance. In this report, pairwise comparisons of opt-out rates are presented by rate, type of rate comparison, and type of messaging presented in the pre-enrollment informational communications. Finally, post-enrollment opt-out rates are presented by rate, CARE/FERA status, climate region, and post-enrollment treatment.

1.2 Overall Findings

The first summer of SCE's default TOU pilot has produced a large amount of information that will help guide SCE's approach to implementation of default TOU pricing. However, it must be kept in mind that these load impact findings are based on only the summer months. Load impacts are going to differ significantly during winter months and the actions of TOU pilot participants may be quite different over the course of a full year.

As described above, differences in load and bill impacts and opt-out rates across customer segments at the service territory level reflect not just differences across segments, but also differences in the mix of customers across climate regions. CARE/FERA customers in the hot climate region and Climate Zone 10 were not allowed to be enrolled on TOU tariffs using default recruitment. Comparisons between CARE/FERA and non-CARE/FERA customers are valid for the moderate and cool climate regions and comparisons across all four climate regions are valid for non-CARE/FERA customers. However, comparisons across segments at the service territory level reflect both differences in behavior across segments as well as differences in the participation of segments across climate regions.

If comparisons are made between SCE's default rates and the prior opt-in pilot, it is important to note that the months included in the evaluation, peak period hours, prices, and inclusion of CARE/FERA customers all changed between the opt-in and default pilots. Therefore, the differences observed between the pilots are not solely a difference in customer response to opt-in versus default enrollment strategies. With these cautions in mind, the remainder of this section provides a high level summary of key findings.

1.2.1 Load Impacts

Table 1-1 presents the average weekday peak period load reduction for each pilot rate. Key findings for load impacts are summarized in following the table.

Table 1-1: Peak Period Load Reductions on Average Weekday

Utility	Metric	Rate 4	Rate 5
SCE	Peak Period Hours	4-9 PM	5-8 PM
	% Impact	1.50%	2.00%
	Absolute Impact (kW)	0.02 kW	0.03 kW

- On average, default customers on both Rates 4 and 5 produced small but statistically significant, peak-period load reductions. Peak period load reductions averaged roughly 1.5% for Rate 4 and 2.0% for Rate 5.
- Load reductions for the common hours shared by the two rates (5 to 8 PM) were greater for Rate 5 than for Rate 4, likely because of the higher peak period price per kWh. It's also possible the shorter peak period of Rate 5 allowed for greater flexibility in customer response to the price signal. The difference was statistically significant for the territory as a whole, the moderate climate region, and Climate Zone 10.
- Statistically significant but small reductions in daily electricity use were found for both rates and in all climate regions. It appears that the average customer in SCE's service territory was more likely to reduce overall usage during the peak period rather than shift usage to off-peak hours.
- The pattern of load reductions across climate regions in absolute terms was consistent between the two rates but was slightly different in percentage terms. Absolute peak period load reductions were largest in Climate Zone 10 and the hot climate regions, but these segments did not include CARE/FERA customers. Absolute impacts were smallest in the cool climate region, which included CARE/FERA and non-CARE/FERA customers.
- In the moderate and cool climate regions, non-CARE/FERA customers typically had statistically significantly greater peak period impacts compared to CARE/FERA customers. One exception was households in the moderate climate region on Rate 4, where the difference was not statistically significant. This finding is consistent with the opt-in TOU pilot.
- With one exception, the incremental peak period impact among households who received the Enhanced E&O treatment compared to households that did not was not statistically significant. In other words, the additional messaging did not increase peak period impacts. The exception was CARE/FERA customers in the moderate climate region who had an incremental increase in load impacts equal to about 0.6%.
- The offer to high bill volatility, low income customers to enroll on the Level Pay Plan as a way of managing volatility in bills across months and seasons was only taken up by a very small number of customers.

Overall, the load impacts were generally in the expected range established during the default pilot design planning stages. The opt-in pilot was designed in a way to be more reflective of opt-out enrollment conditions by using the "pay-to-play" recruitment strategy. However, it was still expected that load impacts would be lower under default conditions due to potentially lower customer awareness rates, and the unavoidable customer self-selection bias of an opt-in recruitment strategy where engaged customers are more likely to enroll.

1.2.2 Structural Bill Impacts

Structural bill impacts were estimated for summer, winter and the year as a whole. Key findings include the following:

- Rate 4 and Rate 5 have very similar distributions of structural benefiters, non-benefiters, and customers in the neutral bill impact category of ±$3/month.
- A majority of customers are neither structural benefiters nor non-benefiters on an annual basis. Over 30% of non-CARE/FERA customers are structural non-benefiters while fewer than 20% of CARE/FERA customers fall into the same category. However, the CARE/FERA group does not include customers in the hot climate region where bill increases under the TOU rates are more likely to occur.
- Over 50% of customers in the hot climate region and Climate Zone 10 are structural non-benefiters on an annual basis. In the summer months, about 80% of customers in these regions are structural non benefiters while about 15% fall into the neutral category.
- Roughly 40% and 60% of CARE/FERA customers in the moderate and cool climate regions, respectively, are neither structural benefiters nor non-benefiters in the summer months.
- In the winter months, between 25% and 30% of non-CARE/FERA customers in all climate regions would save money on TOU rates. This outcome is expected because SCE's OAT is not seasonally differentiated. The TOU rates are seasonally differentiated with higher prices during the summer and lower prices during the winter.

The structural bill impacts were generally as expected for customers transitioning from a non-seasonally differentiated OAT to a seasonally differentiated TOU rate with higher peak period prices in the summer and lower peak period prices in the winter. On average, a large portion of customers are structural non-benefiters in the summer, but many are able to offset the higher priced summer months with lower bills in the winter to reach the neutral category on an annual basis.

1.2.3 Customer Attrition

Customer participation rates were tracked separately for the pre-enrollment period and the post enrollment period. During the pre-enrollment period, customers selected to participate in the pilot could opt-out of the pilot and stay on their current rate, select an alternative TOU rate, or take no action and be enrolled on the assigned TOU pilot rate.

During the post enrollment period customer attrition is driven by three very different factors. One is customers who move, referred to as customer churn. Another is customers who become ineligible as a result of factors such as installing solar, going onto medical baseline, or switching

to service from a Community Choice Aggregator (CCA). The final factor is customers who consciously opt out of the rate because they are unhappy being on a TOU rate.

Key findings concerning customer attrition include the following:

- When the pre-enrollment opt-out decision is defined as selecting the OAT rather than the offered default rate, the difference in opt-out rates between Rates 4 and 5 were very small and not statistically significant. However, when the opt-out decision is defined as choosing either the OAT or the alternative TOU rate, the opt-out rate was about 5% higher (one percentage point) for Rate 4 than for Rate 5. This finding, along with the fact that more customers offered Rate 4 chose Rate 5 than vice versa, indicates that the average customer has a small but statistically significant preference for Rate 5 over Rate 4.
- Customers presented with loss aversion messaging were slightly more likely to opt out before enrollment compared to those who received messaging focused on an opportunity to save money on TOU. This difference was statistically significant.
- There was no difference in pre-enrollment opt-out rates between customers who received a monthly rate comparison and those who received a seasonal rate comparison. Though, it should be noted that a total annual bill comparison was also presented to both informational treatment groups.
- Post-enrollment opt-out rates were very small and fell between 0.7% and 1.0% for CARE/FERA and non-CARE/FERA customers in all climate regions. This indicates the vast majority of customers stay on the rate once they are enrolled on a TOU rate.
- Customers on Rate 4 were statistically significantly more likely to opt out post-enrollment. Again, it is possible the longer peak period was less desirable for some customers. However, the difference was very small (1.3% vs. 1.2%).

The analysis of opt-out rates shows a small but statistically significant preference for Rate 5, with its shorter peak period but higher peak price, over Rate 4. There was also a slight advantage for the “Opportunity to Save” messaging over the “Loss Aversion” message. There were no observed differences in opt-out rates between customers receiving seasonal versus monthly structural bill information. In most instances, the pre-enrollment opt-out rate was roughly 20%, but once customers enrolled on the rate, very few left.

2 Introduction

In Decision 15-07-001, the California Public Utilities Commission (CPUC or the Commission) ordered California's three investor owned utilities (IOUs) to conduct certain "pilot" programs and studies of residential Time-of-Use (TOU) electric rate designs (TOU Pilots and Studies) beginning in 2016, and to file applications no later than January 1, 2018 proposing default TOU rates for residential electric customers. The IOUs were also directed to form a working group (TOU Working Group) to address issues regarding the TOU pilots and to hire one or more qualified independent consultants to assist with the design and implementation of the TOU Pilots and Studies. The TOU Working Group (WG) was comprised of 37 entities and included almost 100 people. Nexant, Inc. was engaged as the independent consultant.

Although the primary focus of the TOU pilots was to provide insights that would guide default implementation, customers were not allowed to be defaulted onto TOU rates prior to January 2018. As such, in 2016, the IOUs implemented pilots based on opt-in enrollment. The pilots, based on a "pay-to-play" randomized control trial, were designed in a way intended to be more reflective of opt-out enrollment conditions. The pilot design and results from these pilots are documented in a number of reports and insights from these pilots were used to guide the design of the default pilots that are the focus of this evaluation.[1]

In late 2016, Nexant worked with the TOU Working Group to develop designs for the default pilots. The design report[2] was used as input to Advice Letter filings by SCE and the two other IOUs. On December 16, 2016 SCE submitted Advice Letter 3531-E[3] detailing the proposal for the default TOU pilot. At the request of the CPUC, and in response to the Office of Ratepayer Advocates protest, SCE submitted Advice Letter 3531-E-A[4] on February 24, 2017 as a supplemental filing to provide additional information on the original Proposed Default Time-of-Use (TOU) Pilot plan. The CPUC issued Resolution E-4847[5] on May 12, 2017 approving the

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[1] George, S., Sullivan, M., Potter, J., & Savage, A. (2015). Time-of-Use Pricing Opt-in Pilot Plan. *Nexant, Inc.* (hereafter referred to as the TOU Pilot Design Report).

SCE: Advice Letter 3335-E; PG&E: Advice Letter 4764-E; and SDG&E: Advice Letter 2835-E.

SCE: Resolution E-4761; PG&E: Resolution E-4762; and SDG&E: Resolution E-4769.

The First Interim Report can be found here: http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442453144 Additional related documents on the CPUC website can be found here: http://www.cpuc.ca.gov/General.aspx?id=12154

The Second Interim Report is contained in two volumes, one authored by Nexant covering the load and bill impact analysis and the second, authored by Research Into Action covering the second survey.
The Nexant report can be found at the following link: http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442455573
The RIA report can be found at: http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442455572

The Final Report can be found here: http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442457172 Additional related documents on the CPUC website can be found here: http://www.cpuc.ca.gov/General.aspx?id=12154

[2] https://www1.sce.com/NR/sc3/tm2/pdf/3531-E.pdf (See Appendix A, starting on Page 86 of the document)

[3] https://www1.sce.com/NR/sc3/tm2/pdf/3531-E.pdf

[4] https://www1.sce.com/NR/sc3/tm2/pdf/3531-E-A.pdf

[5] http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M183/K366/183366304.PDF

pilot plans contained in Advice Letters 3531-E and 3531-E-A and established that SCE's default pilot will gather information on the following objectives:

1. SCE's operational readiness to default large numbers of customers onto TOU rates over a short time. Relevant metrics include call volume, billing exception processing, database capabilities, tracking systems, rate change and bill processing, system enhancements, and bill protection processing.

2. The impact of different marketing, education and outreach (ME&O) strategies on awareness of rate options, opt-out rates, engagement with the TOU rate and customer perceptions while on a TOU rate. Specific ME&O options examined included variation in the type of structural bill information provided in conjunction with the default notifications, two messaging strategies, and different format and content for welcome package materials.

3. The average peak and off-peak change in energy usage by customers enrolled on each default rate (referred to as rates 4 and 5 to reflect differences in the start time for the peak period, 4 PM versus 5 PM).

4. The bill impacts for customers enrolled onto each rate.

5. The opt-out rate for customers defaulted onto each rate under each notification treatment.

6. The impact of options such as level payment plans (LPP) on customer retention on each rate as well as on load and bill impacts and customer perceptions while on their default TOU rate.

An assessment of operational readiness— objective 1— is not included in this evaluation and survey-related metrics such as awareness, customer satisfaction, and others—objective 2— are being addressed through a separate contract with a survey firm. This evaluation report focuses primarily on estimating load and bill impacts and opt-out rates for various treatments – objectives 3 through 6.

The remainder of this section summarizes the pilot design and the specific rate and other treatments included in the pilot. Section 3 provides an overview of the analysis methods that were used to estimate load and bill impacts and to analyze opt-out rates. Sections 4, 5 and 6 present the analysis results for load impacts, bill impacts and opt-out rates, respectively. Finally, key findings for objectives 3 through 6 above are presented in Section 7.

2.1 Experimental Design

A key objective of any pilot or experiment is to establish a causal link between the experimental treatments (e.g., TOU rates, messaging strategy, etc.) and the outcomes of interest (e.g., load impacts, changes in bills, customer satisfaction, etc.). The best way to do this is through strict adherence to a rigorous experimental design that isolates the treatments of interest from other factors that might influence impacts of interest. A randomized encourage design (RED) was used to meet this standard. With an RED, different randomly selected samples of

customers are offered different experimental treatments (in this case, a TOU rate or different content or messaging in the recruitment materials) and another random group of customers is not offered anything (e.g., the control group). Some who are offered the treatment take it and some do not. Because each sample is a statistical clone of the other due to the random selection (especially in this case where sample sizes are quite large), comparing the behavior of the encouraged group with that of the control group allows for an unbiased assessment of the impact of the treatment. This analysis requires a two-step process in order to isolate the impact of the encouragement (e.g., the offer of a treatment) from the treatment itself (e.g., enrolling on the TOU rate), as explained in Section 3.

In this pilot, three random samples of customers of roughly 200,000 households each were drawn. One group was offered default Rate 4, one was offered Rate 5 (the rate offers were the encouragement), and the third was not offered any new rate option. Within each of the two encouraged groups, random samples comprised of roughly 50,000 households received different structural bill comparisons and messaging content as explained more fully in Section 2.2. Because of the large sample sizes and the random selection process, each sample is a statistical clone of the others. As such, any observed differences across the groups in metrics of interest (e.g., load impacts, bill impacts, opt-out rates, etc.) can be attributable to the impact of the treatment offered to each sample or to random error in the sampling process. With such large samples, random error is quite small, which means that the experiment has a very high degree of internal validity.

A comparison of pretreatment load shapes and other observable characteristics available for all customers shows how well the random sampling was done at SCE. Figure 2-1 shows a comparison of customer characteristics between each rate treatment group and the control group and Figure 2-2 and Figure 2-3 show a comparison of average weekday load shapes for the rate treatment and control groups based on pretreatment data. As can be seen, there is no observable difference in any of these characteristics between the treatment and control groups, which ensures that the load and bill impacts and opt-out rates reported in subsequent sections of this report are unbiased and have a very high degree of internal validity.

Figure 2-1: Control Group Demographics Validation

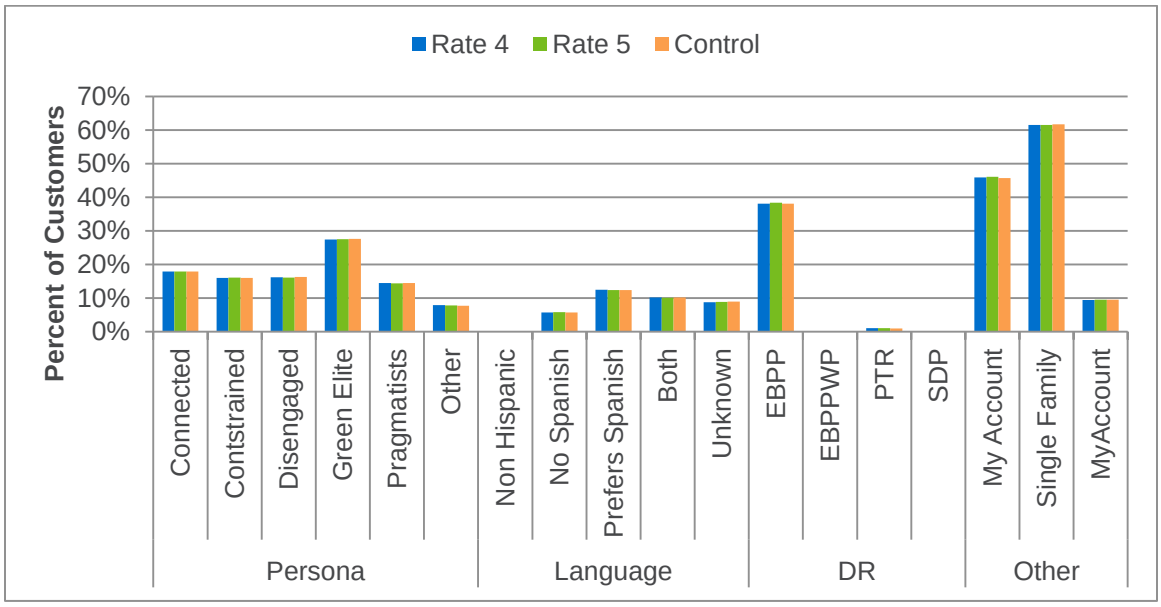


Figure 2-2: Control Group Load Profile Validation – Rate 4

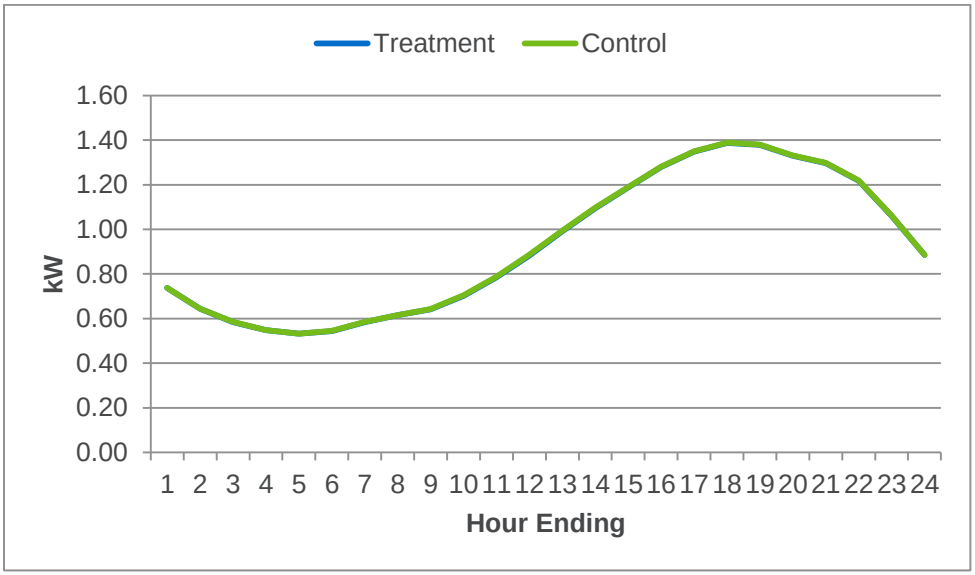
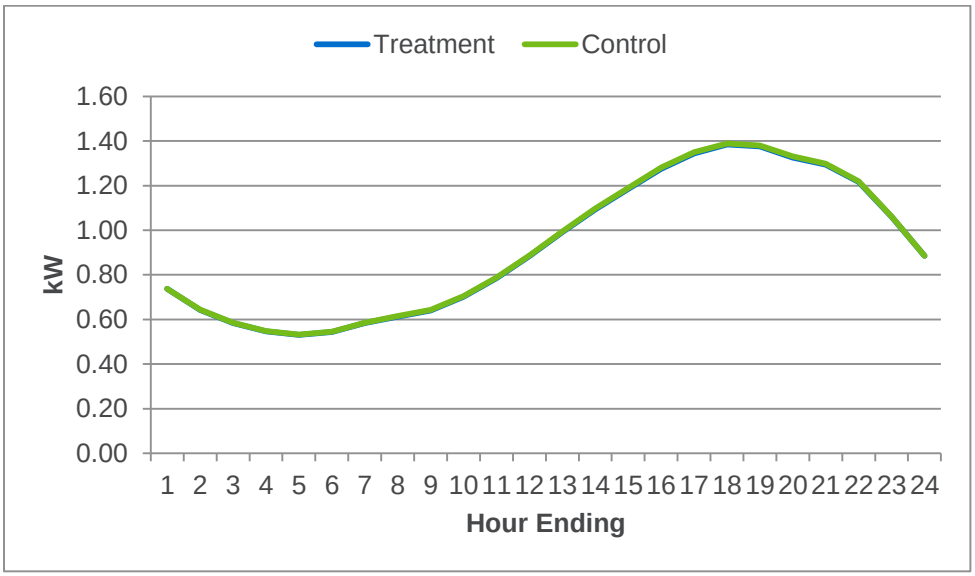


Figure 2-3: Control Group Load Profile Validation – Rate 5



The pilot population includes customers in four climate regions: hot, moderate, cool and California's Climate Zone 10. Climate Zone 10 was included as part of the moderate region in SCE's Opt-In TOU pilot, but was found to have weather conditions more similar to the zones in the hot region. Customers enrolled in the California Alternate Rates for Energy (CARE) and Family Electric Rate Assistance (FERA) programs in the moderate and cool climate region were eligible for default TOU but CARE/FERA customers in the hot climate region and Climate Zone 10 were excluded from default notification.

2.2 Pilot Treatments

Table 2-1 summarizes the default notification treatments that were tested in the pilot. Approximately 400,000 residential customers received default notifications. As seen in the table, an equal number of customers were defaulted onto each of two different TOU rates. In addition, half of the customers on each rate received structural bill information comparing their bills on the default rate and on the otherwise applicable tariff (OAT) on a seasonal basis and the other half received structural bill comparisons on a monthly basis. Finally, half of all customers received a message that focused on managing bills by avoiding usage during high priced peak periods (a "loss aversion" message) while the other half received a message that focused on managing bills by using more electricity during low priced, off-peak periods (the "opportunity" message group). The primary objectives of these tests were to determine:

- If opt-out rates differed between Rates 4 and 5;
- If opt-out rates differed with the content of the notification information concerning rate comparisons and the nature of the message employed;
- What the load and bill impacts were for Rates 4 and 5 and whether they differed by a statistically significant amount in light of the differences in the price ratios and rate periods.

Table 2-1: Default Notification Treatments

Notification Cell	Rate	Rate Comparison	Messaging	Sample Size
1	4	Monthly	Loss Aversion	49,998
2			Opportunity to Save	49,999
3		Seasonal	Loss Aversion	50,000
4			Opportunity to Save	50,000
5	5	Monthly	Loss Aversion	50,000
6			Opportunity to Save	49,998
7		Seasonal	Loss Aversion	50,000
8			Opportunity to Save	49,999

Figure 2-4 and Figure 2-5 show the timing of the rate periods for Rates 4 and 5 and the prices in each period. As seen, Rate 4 is a two-period rate in summer and a three-period rate in winter. Rates and rate periods are the same on weekdays and weekends. The peak period in both summer and winter is from 4 to 9 PM. In winter, there is a super off-peak period from 8 AM to 4 PM. The peak-to-off-peak price ratio in summer is 1.8:1 for usage above the baseline quantity. In winter, the peak and off-peak prices are very similar, but super off-peak prices are about 65% lower than peak-period prices. The structure of Rate 5 is similar to that of Rate 4 except that the peak period is shorter (5 to 8 PM) and peak-period prices are higher, as are the peak-to-off-peak price ratios.

Figure 2-4: Default Pilot Rate 4

Day Type	Season	Hour Ending 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Weekday	Summer	Off-Peak (22¢)																Peak (40¢)							
	Winter	Off-Peak (27¢)								Super Off-Peak (16¢)								Mid-Peak (28¢)							
Weekend	Summer	Off-Peak (22¢)																Mid-Peak (26¢)							
	Winter	Off-Peak (27¢)								Super Off-Peak (16¢)								Mid-Peak (28¢)							

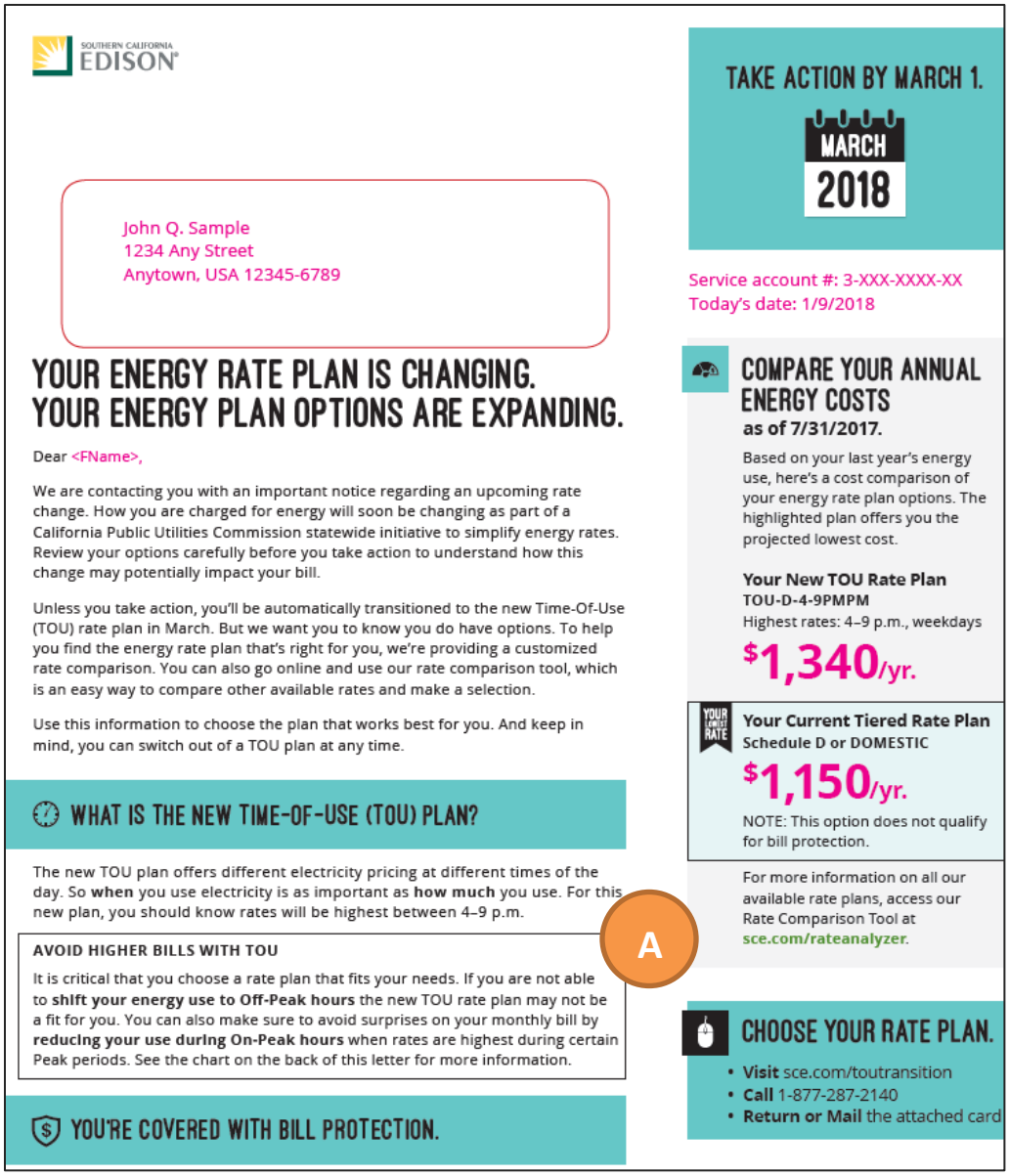
Figure 2-5: Default Pilot Rate 5

Day Type	Season	Hour Ending 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Weekday	Summer	Off-Peak (22¢)																	Peak (47¢)						
	Winter	Off-Peak (27¢)								Super Off-Peak (16¢)									Mid-Peak (29¢)						
Weekend	Summer	Off-Peak (22¢)																	Mid-Peak (28¢)						
	Winter	Off-Peak (27¢)								Super Off-Peak (16¢)									Mid-Peak (29¢)						

Figure 2-6 and Figure 2-7 show examples of two default notification letters. Figure 2-6 is a notification for a customer receiving an offer for Rate 4. In this case, it includes the “loss aversion” message and a seasonal structural bill comparison. Figure 2-7 is a notification for a customer receiving an offer for Rate 5 along with the “opportunity to save” messaging and an annual structural bill comparison. The loss aversion or opportunity messaging can be found in the box to the left of the orange circle with the letter “A”. The seasonal or monthly bill

comparisons are included on the second page of the letter, on a business reply card labeled “B.” Finally, rate information can be found on the third page, labeled “C.”

Figure 2-6: Default Notification – Rate 4 – Seasonal Rate Comparison – Loss Aversion



When your new TOU plan (TOU-D-4-9PM) goes into effect with peak pricing from 4 to 9 p.m., we want you to have peace of mind. So we're offering you free bill protection. In the first year, if you pay more on TOU than you would have paid on your old plan, we'll credit you the difference. **One year of bill protection applies only to the new TOU rate plans TOU-D-4-9PM and TOU-D-5-8PM.**

RATE PLAN CHOICES ARE AVAILABLE.

We want you to know about your rate plan options. **To review your rate plan options and make a selection, visit sce.com/toutransition, return the attached reply card, or call 1-877-287-2140 by 3/1/2018.** If you're already enrolled in CARE/FERA, Medical Baseline, or Net Energy Metering (NEM), your eligibility or surplus credits will not be affected by any of the new energy plan options.

OPTION 1

Take no action and automatically be switched to the new TOU rate plan. Once on the plan, you receive bill protection for the first year and the ability to switch back to your current tiered rate plan at any time.

OPTION 2

YOUR LOWEST RATE

Take action to stay on your current tiered rate plan.

NOTE: This option does not qualify for bill protection.

Detach Here

MAKE YOUR RATE PLAN CHOICE BELOW BY MARCH 1, 2018.

Detach Here

To stay on your current tiered rate, complete and return this portion by 3/1/2018 in the enclosed postage-paid envelope.

B

YOUR RATE COMPARISON*	WINTER AVG. BILL (OCT–MAY)	SUMMER AVG. BILL (JUN–SEP)	ESTIMATED YEARLY COST	CHOOSE ONE OPTION BELOW
Your New TOU Rate (TOU-D-4-9PMPM)	$414	$966	$1,340	**Take no action, and you'll be switched to this rate in March.**
Your Current Tiered Rate (Schedule D or DOMESTIC) YOUR LOWEST RATE	$402	$938	$1,150	☐ Check this box to stay on your current rate.

*Comparison based on your usage from 8/1/16–7/31/17. Billing dates and changes to the amount of your usage will affect these estimates, so your actual costs may vary.

A-E-X

Fold Here Fold Here

Service Account # 3-XXX-XXXX-XX

First Name FName Last Name LName

Service Address 1234 Main Street

City Anytown State CA ZIP 90000

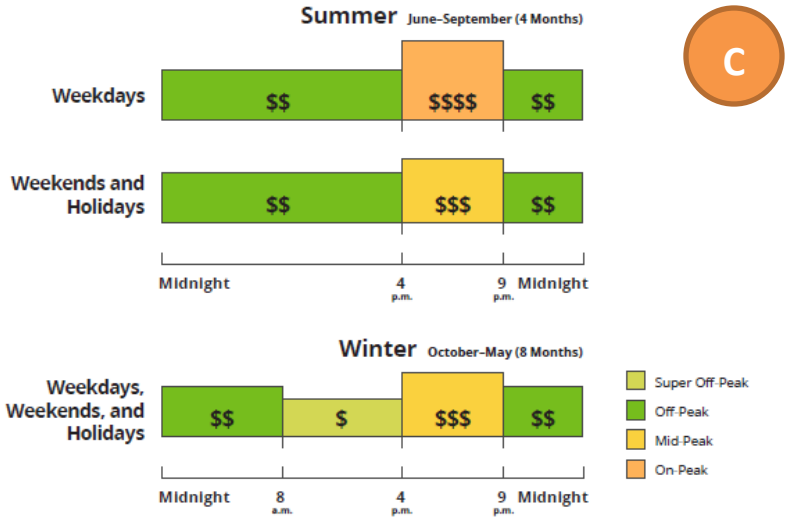
Email Email@Email.com

A signature is required.* Sign Here Date / /

*Only the signature of the primary account holder shown above will be accepted.

TIME-OF-USE HOURS FOR YOUR NEW RATE PLAN: TOU-D-4-9PM

The charts below show the On-Peak and Off-Peak hours for your new TOU rate.



C

If you would like to find out if you are eligible for additional programs, such as Medical Baseline (for households that require power for medical necessities), in-person visits before disconnection (notification option for vulnerable customers), or third-party notifications (if you are a caretaker), go online to www.sce.com/medicalbaseline.

Please use one of these methods to choose your rate plan by March 1, 2018.

Visit sce.com/toutransition

Call 1-877-287-2140

Return or Mail the attached card

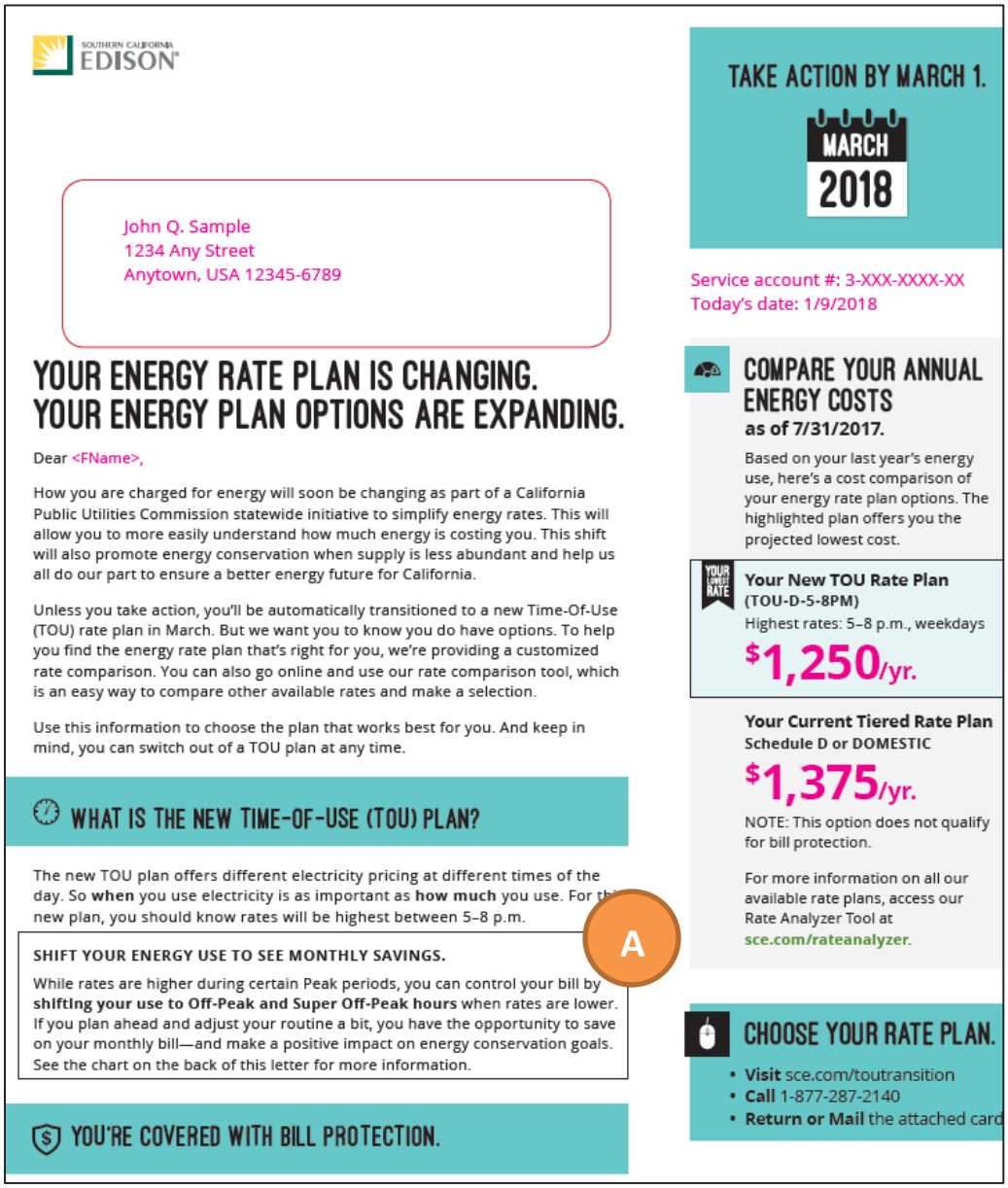
If you have any questions or need more information, please feel free to contact us.

Sincerely,

Marc Ulrich
Vice President, Customer Programs and Services
Southern California Edison

Cambodian / ខ្មែរ	1-800-843-1309
Chinese / 中文	1-800-843-8343
Korean / 한국어	1-800-628-3061
Vietnamese / Tiếng Việt	1-800-327-3031
Spanish / Español	1-800-441-2233

Figure 2-7: Default Notification – Rate 5 – Monthly Rate Comparison – Opportunity to Save



SOUTHERN CALIFORNIA EDISON®

TAKE ACTION BY MARCH 1.

MARCH 2018

John Q. Sample
1234 Any Street
Anytown, USA 12345-6789

Service account #: 3-XXX-XXXX-XX
Today's date: 1/9/2018

YOUR ENERGY RATE PLAN IS CHANGING. YOUR ENERGY PLAN OPTIONS ARE EXPANDING.

Dear <FName>,

How you are charged for energy will soon be changing as part of a California Public Utilities Commission statewide initiative to simplify energy rates. This will allow you to more easily understand how much energy is costing you. This shift will also promote energy conservation when supply is less abundant and help us all do our part to ensure a better energy future for California.

Unless you take action, you'll be automatically transitioned to a new Time-Of-Use (TOU) rate plan in March. But we want you to know you do have options. To help you find the energy rate plan that's right for you, we're providing a customized rate comparison. You can also go online and use our rate comparison tool, which is an easy way to compare other available rates and make a selection.

Use this information to choose the plan that works best for you. And keep in mind, you can switch out of a TOU plan at any time.

WHAT IS THE NEW TIME-OF-USE (TOU) PLAN?

The new TOU plan offers different electricity pricing at different times of the day. So **when** you use electricity is as important as **how much** you use. For th new plan, you should know rates will be highest between 5–8 p.m.

SHIFT YOUR ENERGY USE TO SEE MONTHLY SAVINGS.

While rates are higher during certain Peak periods, you can control your bill by **shifting your use to Off-Peak and Super Off-Peak hours** when rates are lower. If you plan ahead and adjust your routine a bit, you have the opportunity to save on your monthly bill—and make a positive impact on energy conservation goals. See the chart on the back of this letter for more information.

A

YOU'RE COVERED WITH BILL PROTECTION.

COMPARE YOUR ANNUAL ENERGY COSTS

as of 7/31/2017.

Based on your last year's energy use, here's a cost comparison of your energy rate plan options. The highlighted plan offers you the projected lowest cost.

YOUR LOWEST RATE

Your New TOU Rate Plan
(TOU-D-5-8PM)
Highest rates: 5–8 p.m., weekdays
$1,250/yr.

Your Current Tiered Rate Plan
Schedule D or DOMESTIC
$1,375/yr.
NOTE: This option does not qualify for bill protection.

For more information on all our available rate plans, access our Rate Analyzer Tool at sce.com/rateanalyzer.

CHOOSE YOUR RATE PLAN.

- **Visit** sce.com/toutransition
- **Call** 1-877-287-2140
- **Return or Mail** the attached card

When your new TOU plan (TOU-D-5-8PM) goes into effect with peak pricing from 5 to 8 p.m., we want you to have peace of mind. So we're offering you free bill protection. In the first year, if you pay more on TOU than you would have paid on your previous plan, we'll credit you the difference. **One year of bill protection applies only to the new TOU rate plans TOU-D-4-9PM and TOU-D-5-8PM.**

RATE PLAN CHOICES ARE AVAILABLE.

We want you to know about your rate plan options. **To review your rate plan options and make a selection, visit sce.com/toutransition, return the attached reply card, or call 1-877-287-2140 by 3/1/2018.** If you're already enrolled in CARE/FERA, Medical Baseline, or Net Energy Metering (NEM), your eligibility or surplus credits will not be affected by any of the new energy plan options.

OPTION 1

YOUR LOWEST RATE

Take no action and automatically switch to the new TOU rate plan. Once on the plan, you'll receive bill protection for the first year, and be able to switch back to your current tiered rate plan at any time.

OPTION 2

Take action to stay on your current tiered rate plan.

NOTE: This option does not qualify for bill protection.

Detach Here

MAKE YOUR RATE PLAN CHOICE BELOW BY MARCH 1, 2018.

Detach Here

To stay on your current tiered rate, complete and return this portion by 3/1/2018 in the enclosed postage-paid envelope.

B

YOUR RATE COMPARISON*	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ESTIMATED YEARLY COST	CHOOSE ONE OPTION BELO
YOUR NEW TOU RATE (TOU-D-5-8PM) YOUR LOWEST RATE	$80	$85	$65	$70	$105	$135	$172	$145	$138	$107	$68	$66	$1,250	Take no action and switch to this rate in March.
YOUR CURRENT TIERED RATE (SCHEDULE D OR DOMESTIC)	$102	$98	$85	$83	$128	$135	$132	$140	$140	$116	$90	$91	$1,375	☐ Check this box to stay on your current rate.

*Comparison is based on your usage from 8/1/16–7/31/17. Billing dates and changes to the amount of your usage will affect these estimates, so your actual costs may vary.

A-E-X

Fold Here Fold Here

Service Account # 3-XXX-XXXX-XX

First Name FName Last Name LName

Service Address 1234 Main Street

City Anytown State CA ZIP 90000

Email Email@Email.com

A signature is required.* Sign Here Date / /

*Only the signature of the primary account holder shown above will be accepted.

TIME-OF-USE HOURS FOR YOUR NEW RATE PLAN: TOU-D-5-8PM

The charts below show the On-Peak and Off-Peak hours for your new TOU rate.

If you would like to find out if you are eligible for additional programs, such as Medical Baseline (for households that require power for medical necessities), in-person visits before disconnection (notification option for vulnerable customers), or third-party notifications (if you are a caretaker), go online to www.sce.com/medicalbaseline.

Please use one of these methods to choose your rate plan by March 1, 2018.

Visit sce.com/toutransition

Call 1-877-287-2140

Return or Mail the attached card

If you have any questions or need more information, please feel free to contact us.

Sincerely,

Marc Ulrich
Vice President, Customer Programs and Services
Southern California Edison

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Chinese / 中文	1-800-843-8343
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Vietnamese / Tiếng Việt	1-800-327-3031
Spanish / Español	1-800-441-2233

Table 2-2 summarizes the various treatments that were examined after customers enrolled on the new TOU rates and the samples sizes for each treatment group. The total sample for the post-default treatments is estimated to equal roughly 310,000 customers. The drop of 90,000 from the 400,000 customers who received default notifications is attributable to normal customer churn, changes in eligibility (e.g., medical baseline, etc.), customers who enrolled on a TOU rate other than the one offered in the default notice, and customers who chose to stay on the OAT.

The enrolled population on each of the default rates was divided equally into those slated to receive basic or enhanced welcome packets and ongoing education and outreach (E&O) communication, and then segmented further into two groups, those deemed to be most

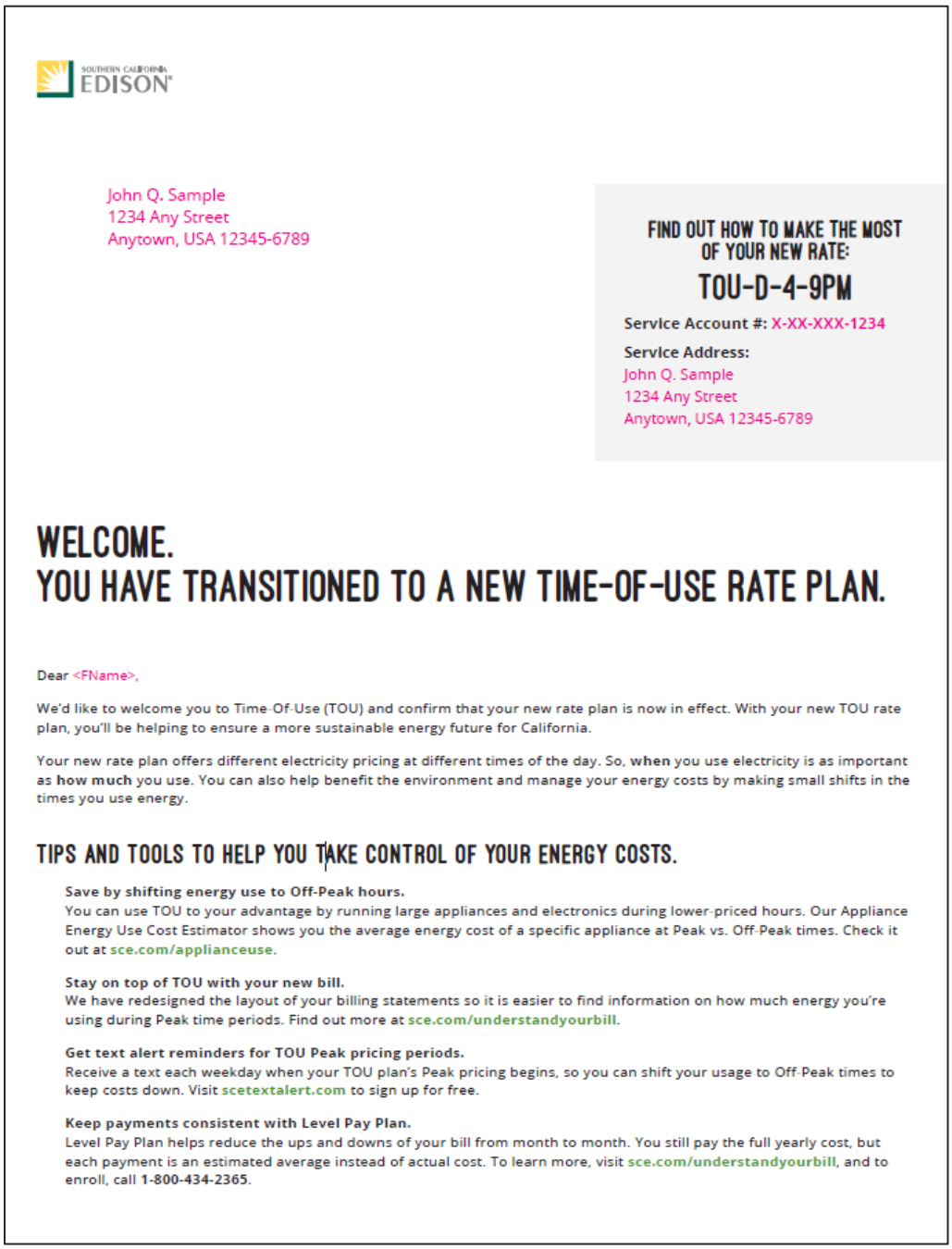
impacted by bill volatility and those who are not. The segment of customers impacted by bill volatility was considered to be income-constrained customers who were expected to experience increased seasonal bill differentials under the default TOU rate. The criteria for inclusion in this segment are CARE or FERA enrolled customers for whom the (absolute) difference in average summer and average winter bills is higher under their default TOU rate than under the OAT. Approximately 17% of all enrolled customers were identified as impacted by bill volatility. As seen in Table 2-2, this segment of customers is further divided into two equal groups, with one group receiving information on SCE's Level Payment Plan (LPP) as a means of managing month-to-month bill volatility.

Table 2-2: Post-Enrollment Treatments

Aftercare Cell	Rate	Communication	Impacted by Bill Volatility	LPP Promotion	Sample Size
1	4	Enhanced E&O	Impacted by Bill Volatility	LPP Promotion	6,448
2				No Promotion	6,448
3			Not Impacted	No Promotion	64,245
4		Basic E&O	Impacted by Bill Volatility	LPP Promotion	6,420
5				No Promotion	6,418
6			Not Impacted	No Promotion	64,245
7	5	Enhanced E&O	Impacted by Bill Volatility	LPP Promotion	6,646
8				No Promotion	6,644
9			Not Impacted	No Promotion	65,311
10		Basic E&O	Impacted by Bill Volatility	LPP Promotion	6,705
11				No Promotion	6,703
12			Not Impacted	No Promotion	65,195

Figure 2-8 and Figure 2-9 show the basic and enhanced welcome packets. One difference between the two welcome packets concerns formatting, with the basic welcome packet being a simple business letter and the enhanced packet being more like a glossy brochure. The enhanced packet also contains more information about available programs and tools for managing energy use and bills under TOU rates, such as incentives for smart thermostats, Budget Assistant (a usage alert tool), and online tools accessible through My Account, among others.

Figure 2-8: Basic Welcome Packet Format and Content



SOUTHERN CALIFORNIA EDISON®

John Q. Sample
1234 Any Street
Anytown, USA 12345-6789

FIND OUT HOW TO MAKE THE MOST OF YOUR NEW RATE:

TOU-D-4-9PM

Service Account #: X-XX-XXX-1234

Service Address:
John Q. Sample
1234 Any Street
Anytown, USA 12345-6789

WELCOME.
YOU HAVE TRANSITIONED TO A NEW TIME-OF-USE RATE PLAN.

Dear <FName>,

We'd like to welcome you to Time-Of-Use (TOU) and confirm that your new rate plan is now in effect. With your new TOU rate plan, you'll be helping to ensure a more sustainable energy future for California.

Your new rate plan offers different electricity pricing at different times of the day. So, **when** you use electricity is as important as **how much** you use. You can also help benefit the environment and manage your energy costs by making small shifts in the times you use energy.

TIPS AND TOOLS TO HELP YOU TAKE CONTROL OF YOUR ENERGY COSTS.

Save by shifting energy use to Off-Peak hours.
You can use TOU to your advantage by running large appliances and electronics during lower-priced hours. Our Appliance Energy Use Cost Estimator shows you the average energy cost of a specific appliance at Peak vs. Off-Peak times. Check it out at sce.com/applianceuse.

Stay on top of TOU with your new bill.
We have redesigned the layout of your billing statements so it is easier to find information on how much energy you're using during Peak time periods. Find out more at sce.com/understandyourbill.

Get text alert reminders for TOU Peak pricing periods.
Receive a text each weekday when your TOU plan's Peak pricing begins, so you can shift your usage to Off-Peak times to keep costs down. Visit scetextalert.com to sign up for free.

Keep payments consistent with Level Pay Plan.
Level Pay Plan helps reduce the ups and downs of your bill from month to month. You still pay the full yearly cost, but each payment is an estimated average instead of actual cost. To learn more, visit sce.com/understandyourbill, and to enroll, call 1-800-434-2365.

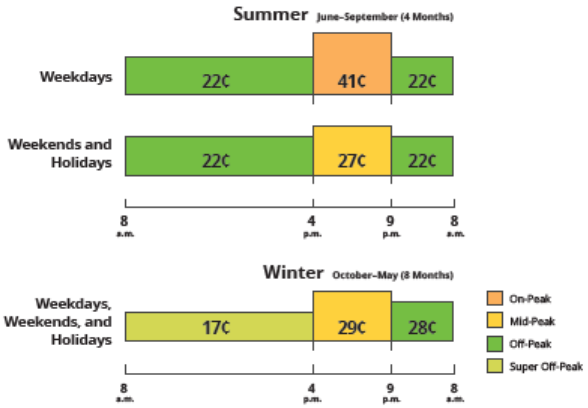
MORE INFORMATION IS JUST A CLICK AWAY.

Enjoy peace of mind with Bill Protection.
Your rate comes with 12 months of Bill Protection. If your bill is higher on the new TOU rate than your prior Tiered rate plan, you will be credited the difference at the end of the Bill Protection period. You can track your progress on your monthly bill statement.

Know your rate plan options.
You have the flexibility to switch to a different TOU rate plan or a Tiered rate plan at any time. There's no minimum time commitment on your new transition rate plan.

Special programs are unaffected by TOU.
If you're in the CARE/FERA program, your eligibility will not be affected by your change to the new TOU rate plan. For Net Energy Metering customers, your surplus credits will not be affected by your change to your new TOU rate plan.

Take control of your energy costs.
Here is a helpful reminder of when your Super Off-Peak and Off-Peak hours are, to aid you in shifting your usage to these lower-cost periods and help you manage your costs.



To learn more about TOU or to change your energy rate, call 1-877-287-2140 or visit sce.com/intro2tou.

Sincerely,

Jill C. Anderson

Vice President, Customer Programs and Services
Southern California Edison

Cambodian / ខ្មែរ	1-800-843-1309
Chinese / 中文	1-800-843-8343
Korean / 한국어	1-800-628-3061
Vietnamese / Tiếng Việt	1-800-327-3031
Spanish / Español	1-800-441-2233

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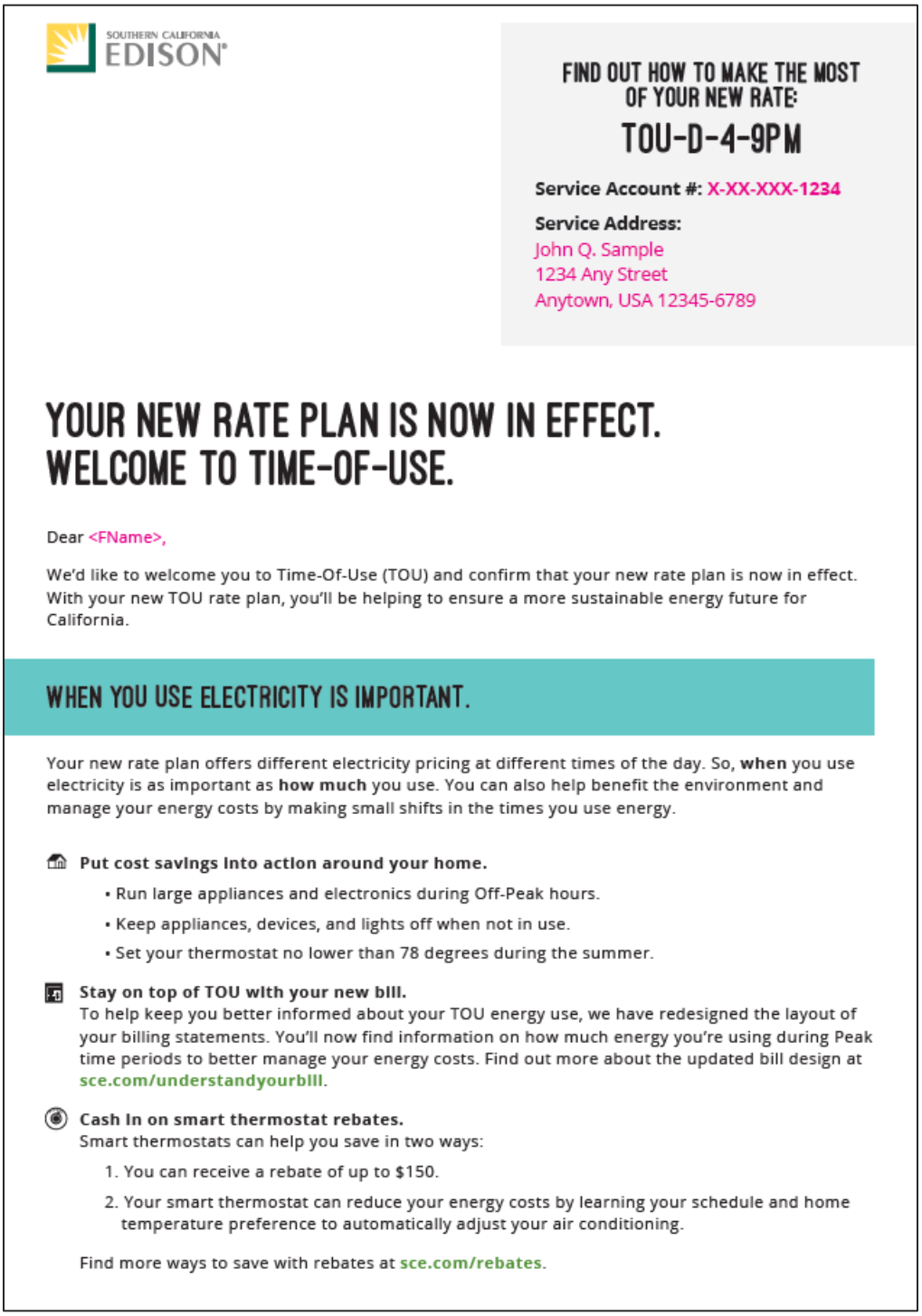
Eligibility for residential TOU rates is subject to the conditions of SCE's Commission-approved tariffs. Customers that are transitioned to their TOU rate (TOU-D-4-9PM & TOU-D-5-8PM) are allowed to switch rates twice before being required to remain on the rate for a 12-month period. Any bill credit rewards received are yours to keep without any further obligation. Level Pay Plan may be affected after your bill protection ends.

Figure 2-9: Enhanced Welcome Packet Format and Content



SOUTHERN CALIFORNIA EDISON®

FIND OUT HOW TO MAKE THE MOST OF YOUR NEW RATE:

TOU-D-4-9PM

Service Account #: X-XX-XXX-1234

Service Address:
John Q. Sample
1234 Any Street
Anytown, USA 12345-6789

YOUR NEW RATE PLAN IS NOW IN EFFECT. WELCOME TO TIME-OF-USE.

Dear <FName>,

We'd like to welcome you to Time-Of-Use (TOU) and confirm that your new rate plan is now in effect. With your new TOU rate plan, you'll be helping to ensure a more sustainable energy future for California.

WHEN YOU USE ELECTRICITY IS IMPORTANT.

Your new rate plan offers different electricity pricing at different times of the day. So, **when** you use electricity is as important as **how much** you use. You can also help benefit the environment and manage your energy costs by making small shifts in the times you use energy.

Put cost savings into action around your home.

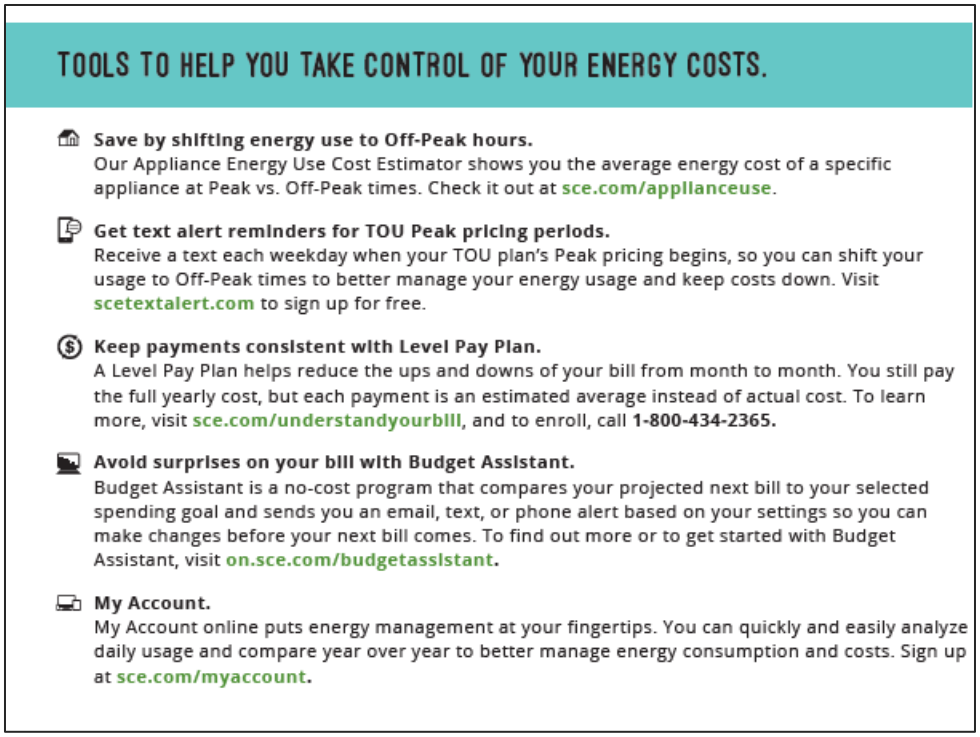
- Run large appliances and electronics during Off-Peak hours.
- Keep appliances, devices, and lights off when not in use.
- Set your thermostat no lower than 78 degrees during the summer.

Stay on top of TOU with your new bill.
To help keep you better informed about your TOU energy use, we have redesigned the layout of your billing statements. You'll now find information on how much energy you're using during Peak time periods to better manage your energy costs. Find out more about the updated bill design at sce.com/understandyourbill.

Cash in on smart thermostat rebates.
Smart thermostats can help you save in two ways:

1. You can receive a rebate of up to $150.
2. Your smart thermostat can reduce your energy costs by learning your schedule and home temperature preference to automatically adjust your air conditioning.

Find more ways to save with rebates at sce.com/rebates.



TOOLS TO HELP YOU TAKE CONTROL OF YOUR ENERGY COSTS.

Save by shifting energy use to Off-Peak hours.
Our Appliance Energy Use Cost Estimator shows you the average energy cost of a specific appliance at Peak vs. Off-Peak times. Check it out at **sce.com/applianceuse**.

Get text alert reminders for TOU Peak pricing periods.
Receive a text each weekday when your TOU plan's Peak pricing begins, so you can shift your usage to Off-Peak times to better manage your energy usage and keep costs down. Visit **scetextalert.com** to sign up for free.

Keep payments consistent with Level Pay Plan.
A Level Pay Plan helps reduce the ups and downs of your bill from month to month. You still pay the full yearly cost, but each payment is an estimated average instead of actual cost. To learn more, visit **sce.com/understandyourbill**, and to enroll, call **1-800-434-2365.**

Avoid surprises on your bill with Budget Assistant.
Budget Assistant is a no-cost program that compares your projected next bill to your selected spending goal and sends you an email, text, or phone alert based on your settings so you can make changes before your next bill comes. To find out more or to get started with Budget Assistant, visit **on.sce.com/budgetassistant.**

My Account.
My Account online puts energy management at your fingertips. You can quickly and easily analyze daily usage and compare year over year to better manage energy consumption and costs. Sign up at **sce.com/myaccount.**

MORE INFORMATION IS JUST A CLICK AWAY.

Enjoy peace of mind with Bill Protection.
Your rate comes with 12 months of Bill Protection. If your bill is higher on the new TOU rate than your prior Tiered rate plan, you will be credited the difference at the end of the Bill Protection period. You can track your progress on your monthly bill statement.

Know your rate plan options.
You have the flexibility to switch to a different TOU rate plan or a Tiered rate plan at any time. There's no minimum time commitment on your new transition rate plan.

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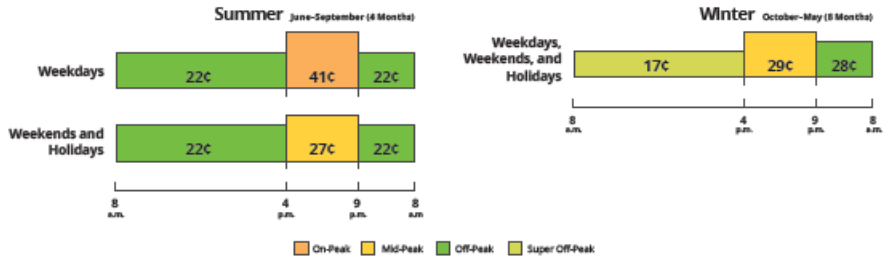
To learn more about TOU or to change your energy rate, call **1-877-287-2140** or visit sce.com/newtou.

Take control of your energy costs.
Here is a helpful reminder of when your Super Off-Peak and Off-Peak hours are, to aid you in shifting your usage to these lower-cost periods and help you manage your costs. For more information on TOU rate plans, visit sce.com/newtou.



To learn more about TOU or to change your new rate, visit sce.com/newtou.

Sincerely,

Jill C. Anderson

Vice President, Customer Programs and Services
Southern California Edison

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Chinese / 中文	1-800-843-8343
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Vietnamese / Tiếng Việt	1-800-327-3031
Spanish / Español	1-800-441-2233

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3 Methodology

As discussed in Section 2, this report provides load impacts for the initial summer period of the pilot (June through September, 2018), and structural bill impacts for each of the two rate treatments tested at SCE for various customer segments and climate regions. The incremental load impacts for the enhanced E&O treatment were also tested. Opt-out rates for various rate and notification treatments are also reported in Section 6. This section summarizes the methodological approaches used to estimate the metrics of interest for each pilot treatment. The discussion is organized into three broad sections summarizing the approach for estimating load impacts, structural bill impacts, and opt-out rates.

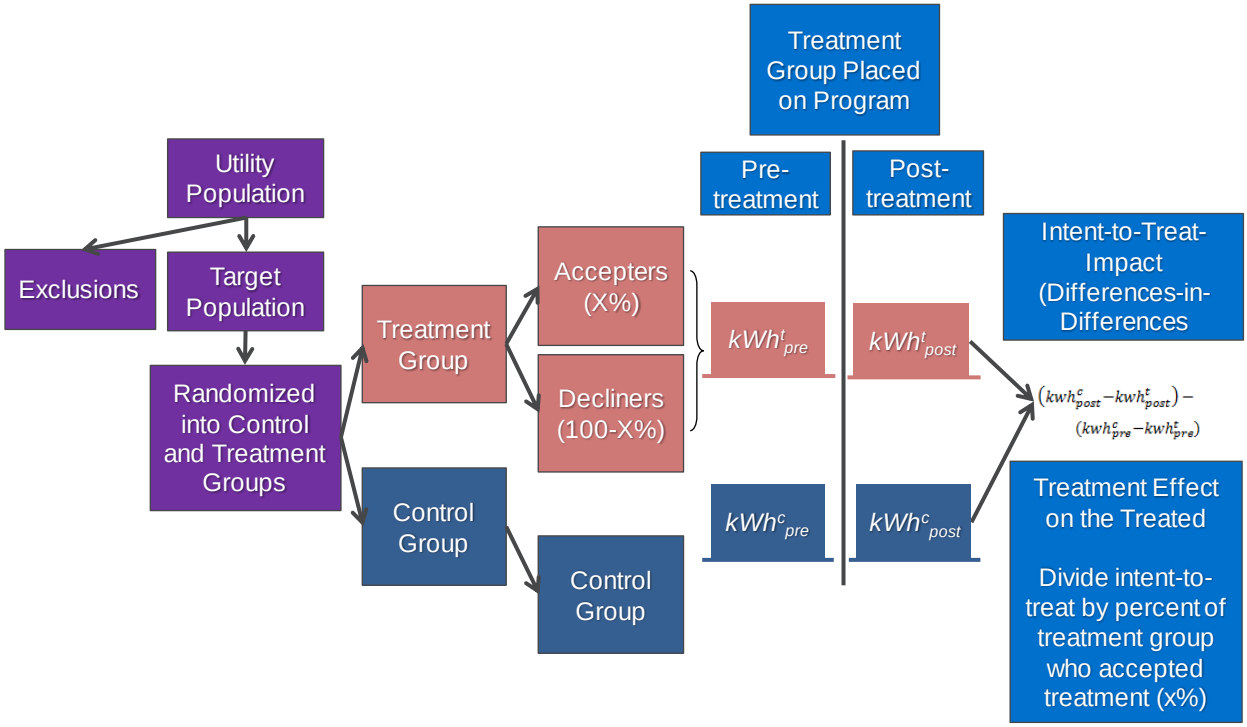
3.1 Load Impacts

The estimation of load impacts by rate period and changes in annual and seasonal energy use for each pilot rate are key pilot objectives. Also of interest is how load impacts vary across climate regions and customer segments (e.g., non-CARE/FERA customers and CARE/FERA customers) for two of the four climate regions, since CARE/FERA customers could not be defaulted in the two hot climate regions. The approach used to estimate load impacts is summarized below.

As discussed above, the pilot involves a randomized encouragement experimental design. With a RED structure involving a single rate treatment of interest (for simplicity), the study sample is randomly divided into two groups. One group is offered the treatment and the other is not. The group offered the treatment is referred to as the encouraged group and the group not offered the treatment is referred to as the control group. Some people in the encouraged group will accept the treatment and others will not. With a RED, impacts for those who accept the treatment offer are estimated through a two-step process. In the first step, loads by time period for the encouraged group are subtracted from loads for the control group. As stated above, the encouraged group includes both those who accept the encouragement (that is, those who enroll on the new rate) and those who do not. The estimated load impact based on these two groups of customers is referred to as the intention-to-treat (ITT) effect. In the second analysis step, the ITT estimate is divided by the percent of the encouraged group who take up the treatment offer. This value represents the impact for those who took the treatment (referred to as the impact of the treatment on the treated).[6] A conceptual overview of the RED design and analysis for estimating load impacts is shown in Figure 3-1.

[6] This second stage calculation relies on an assumption that decliners are not influenced by the fact that they received an offer. If, for example, decliners shifted load simply because they received an offer to go on a new rate, load impact estimates for non-decliners would be biased upward.

Figure 3-1: Design and Analysis Schematic for a RED Experiment



For the pilot, the first stage ITT impact was estimated using what is called a difference-in-differences (DiD) analysis. This method estimates impacts by subtracting treatment customers' loads (or in this first stage, the encouraged customers' loads) from control customers' loads in each hour or time period after the treatments are in place and subtracts from this value the difference in loads between treatment and control customers for the same time period in the pretreatment period. Subtracting any difference between treatment and control customers prior to the treatment going into effect adjusts for any difference between the two groups that might occur due to random chance.

The DiD calculation can be done arithmetically using simple averages or can be done using regression analysis. Customer fixed effects regression analysis allows each customer's mean usage to be modeled separately, which reduces the standard error of the impact estimates without changing their magnitude. Additionally, regression software allows for the calculation of standard errors, confidence intervals, and significance tests for load impact estimates that correctly account for the correlation in customer loads over time.[7] Implementing a DiD through simple arithmetic would yield the same point estimate but it would not generate confidence intervals.

A typical regression specification for estimating impacts is shown below:

$$kW_{i,t} = \alpha_i + \delta \text{treat}_i + \gamma \text{post}_t + \beta(\text{treatpost})_{i,t} + \nu_i + \varepsilon_{i,t}$$

In the above equation, the variable $\text{kW}_{\text{i,t}}$ equals electricity usage during the time period of interest, which might be each hour of the day, peak or off-peak periods, daily usage or some

[7] More accurately, they account for the correlation in regression errors within customers over time.

other period. The index i refers to customers and the index t refers to the time period of interest. The estimating database would contain electricity usage data during both the pretreatment and post-treatment periods for both treatment (encouraged) and control group customers. The variable treat is equal to 1 for treatment customers and 0 for control customers, while the variable post is equal to 1 for days after the TOU rate has been implemented and a value of 0 for days during the pretreatment period. The treat post term is the interaction of treat and post and its coefficient β is a difference-in-differences estimator of the treatment effect that makes use of the pretreatment data. The primary parameter of interest is β, which provides the estimated demand impact during the relevant period. The parameter a_i is equal to mean usage for each customer for the relevant time period (e.g., hourly, peak period, etc.). The v_i term is the customer fixed effects variable that controls for unobserved factors that are time-invariant and unique to each customer.

Customer attrition is an important factor to address in the load impact analysis. Customer attrition stems from four factors; customers who move (referred to as churn); customers who become ineligible after enrolling in the pilot; customers who opted out before the pilot began, and customers who dropped off the rate after enrollment because they were unhappy being on the TOU rate. Customer churn and changes in eligibility should be the same for both treatment and control customers. As such, dropping customers from both treatment and control groups due to churn and changes in eligibility does not introduce selection effects.

The majority of load impact estimates reported in Section 4 are based on a comparison of loads between each treatment group and the control group. Estimates for customer segments and climate regions are developed by first partitioning the treatment and control groups into samples for each climate region and/or customer segment of interest and then applying the analysis method outlined above to the partitioned data. An exception to this approach occurs when examining the incremental impact of the enhanced E&O options summarized in Section 2.2. For this analysis, data for the two treatment groups (e.g., standard and enhanced E&O treatments) are combined. The standard treatment acts as a control group for the enhanced treatment and the estimated impact represents the incremental impact of the enhanced treatment

The load impact estimates reported here conform to the requirements for ex post evaluation of non-event based demand response resources as indicated in California's Demand Response Load Impact Protocols.[8] These protocols require that load impacts in each hour be developed for the average weekday and monthly system peak days for each month of the year. Although not explicitly required by the protocols, load impacts for the average weekend day are also developed for each month of the year given that the TOU rates are also effective on the weekends. As this is an ex post evaluation, average weekday impacts are based on the observed customer load pooled across the weekdays in each month, and similarly for weekend days. Monthly system peak day impacts are estimated based on loads that occur on the historical monthly system peak days. Weather normalized results, such as those conducted for demand response ex ante load impacts, are not currently in scope for this evaluation. Load impacts are presented in both nominal (kWh) and proportional (%) terms.

[8] http://www.calmac.org/events/FinalDecision_AttachementA.pdf

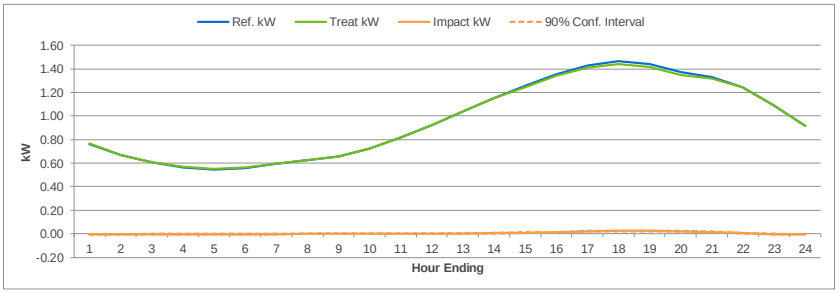
Figure 3-2 displays an image from an Excel spreadsheet containing the output that is produced for each rate treatment, customer segment, climate region, day type, and month covered by this interim analysis. These Excel spreadsheets are available upon request through the CPUC. Pull down menus in the upper left hand corner of the spreadsheet allow users to select different customer segments, climate regions, day types (e.g., weekdays, weekends, monthly peak day) and time period (individual months or the average of June, July, August and September). In this written report, tables and graphs are presented that report estimated load impacts by treatment, rate period, customer segment, and day type for the summer period.

As discussed in Section 2 the experimental design and sampling were constructed so that load impacts and other metrics can be reported for selected customer segments and climate regions. For the segments around which the pilots were designed, load impacts are estimated using the model represented in the equation above for the data partitioned by segment (for both treatment and control customers). These estimates are internally valid by virtue of the RED design and DiD analysis.

Figure 3-2: Average Hourly Load Impact Estimates for Rate 4

Rate	Rate 4
Segment	All
Time Period	Summer
Day Type	Average Weekday

Period	Control Customers	Treatment Customers	Ref. kW	Treat kW	Impact kW	90% Conf. Interval		% Impact
Peak	184,208	148,571	1.41	1.39	0.02	0.02	0.02	1.5%
Mid-Peak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Off-Peak	184,208	148,571	0.85	0.85	0.00	0.00	0.00	0.1%
Super Off-Peak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Day (kWh)	**184,208**	**148,571**	**23.14**	**23.02**	**0.12**	**0.11**	**0.13**	**0.5%**



Hour	Period	Ref. kW	Treat kW	Impact kW	90% Conf. Interval		% Impact
1	Off-Peak	0.76	0.77	0.00	-0.01	0.00	-0.5%
2	Off-Peak	0.67	0.67	0.00	-0.01	0.00	-0.6%
3	Off-Peak	0.61	0.61	0.00	0.00	0.00	-0.5%
4	Off-Peak	0.57	0.57	0.00	0.00	0.00	-0.4%
5	Off-Peak	0.55	0.55	0.00	0.00	0.00	-0.4%
6	Off-Peak	0.56	0.56	0.00	0.00	0.00	-0.5%
7	Off-Peak	0.59	0.60	0.00	0.00	0.00	-0.5%
8	Off-Peak	0.62	0.62	0.00	0.00	0.00	0.0%
9	Off-Peak	0.65	0.65	0.00	0.00	0.00	0.1%
10	Off-Peak	0.72	0.72	0.00	0.00	0.00	0.1%
11	Off-Peak	0.82	0.81	0.00	0.00	0.00	0.2%
12	Off-Peak	0.92	0.92	0.00	0.00	0.00	0.1%
13	Off-Peak	1.04	1.04	0.00	0.00	0.01	0.3%
14	Off-Peak	1.15	1.15	0.01	0.00	0.01	0.5%
15	Off-Peak	1.25	1.25	0.01	0.01	0.01	0.7%
16	Off-Peak	1.35	1.34	0.01	0.01	0.01	0.9%
17	Peak	1.43	1.41	0.02	0.02	0.02	1.5%
18	Peak	1.47	1.44	0.02	0.02	0.03	1.7%
19	Peak	1.44	1.42	0.02	0.02	0.03	1.7%
20	Peak	1.37	1.35	0.02	0.02	0.02	1.6%
21	Peak	1.33	1.32	0.02	0.01	0.02	1.2%
22	Off-Peak	1.25	1.24	0.00	0.00	0.01	0.4%
23	Off-Peak	1.09	1.09	0.00	0.00	0.00	-0.2%
24	Off-Peak	0.91	0.92	0.00	-0.01	0.00	-0.4%

3.2 Structural Bill Impacts

The impact of TOU rates on customers' bills is an important metric of interest to stakeholders, and a primary objective of the evaluation. When customers are transitioned to TOU rates, their bills can change in two ways. The first is due simply to the change in the pricing structure, holding behavior constant. The second is due to changes in behavior as a result of the difference in price signals. The first change is known as a structural bill impact, and can be computed based on usage data prior to customers enrolling on the new rate. Factoring in the impact of behavior change in response to the new prices requires analysis of post-enrollment loads for both treatment and control customers in order to control for changes that might be due to factors other than differences in prices. Because bill impacts can vary rather significantly across seasons, and since this report is based only on usage for the summer season, this evaluation does not present behavioral impacts or total bill impacts. Those will be presented after customers have been on the new tariffs for a full year.

Structural bill impacts were estimated for the summer, winter, and annual time periods using pretreatment data for the treatment group for each rate and relevant customer segment. Annual impacts are based on monthly bill estimates from January to December 2017. This time period was selected to ensure that customer energy use was as close to the present time as possible, but wasn't significantly influenced by SCE's communications with customers about the pilot. Summer impacts are based on June through September 2017 and winter impacts are based on January through May and October through December 2017.

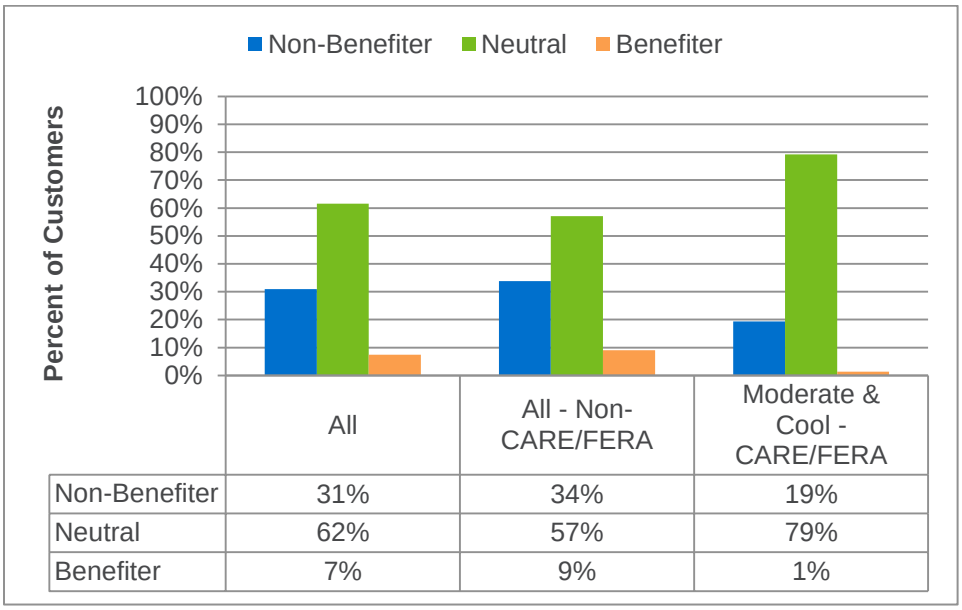
Average monthly bills for each treatment group customer on the OAT and TOU rate were provided by SCE. The difference in bills on the TOU rate and the OAT will identify whether a customer was a structural benefiter or non-benefiter, as shown in the equation below:

$$\begin{aligned} &Structural\ Bill\ Impact \\ &\quad = (bill\ calculated\ with\ pretreatment\ usage\ on\ TOU\ rate) \\ &\quad - (bill\ calculated\ with\ pretreatment\ usage\ on\ OAT) \end{aligned}$$

Many customers experienced structural bill impacts that were close to zero. As such, it could appear that a large share of customers were structural benefiters or non-benefiters even when bill impacts for a large number of customers are quite small. To address this, a neutral category of +/- $3 per month was defined. The neutral category helps ensure that the assignment to the structural benefiter or non-benefiter category is more meaningful and not overly influenced by customers who would experience a difference in bills of only a few dollars.

The final results from the structural benefiter / non-benefiter analysis are presented in column graphs and shown as percentages for the each season and on an annual basis. An example is shown in Figure 3-3. For each rate and relevant segment, the percentage of customers who are non-benefiters, neutral (+/- $3), or benefiters based on their average monthly bills for the time period of interest are shown as individual columns. The three columns within each rate and segment combination total 100%, thus showing the distribution of structural benefiters and non-benefiters for each rate and segment of interest.

Figure 3-3: Example of Structural Bill Impact Results (Annual, Rate 4)



	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Non-Benefiter	31%	34%	19%
Neutral	62%	57%	79%
Benefiter	7%	9%	1%

3.3 Opt-Out Analysis

Analysis of customer opt-out rates provides useful insights concerning relative customer preferences among the rate options and may also help predict what opt-out rates might be under full scale roll out of default TOU pricing. Comparisons of pre-enrollment opt-out rates across rate options are indicators of the relative preferences of customers for each rate option and comparisons across notification content and messaging within a rate option can provide insights about the relative effectiveness of these notification alternatives. Comparisons across customer segments and climate regions reflect the influence of these factors on customer acceptance.

In this report, customer attrition was measured in two key time periods: pre-enrollment and post-enrollment. A series of t-tests were used to determine if there were statistically significant differences in pairwise comparisons of pre-enrollment opt-out rates across the two TOU options, differences in the structural bill comparison information provided as part of the notification (e.g., seasonal versus annual), and the type of messaging presented in the pre-enrollment informational communications. T-tests were also used to identify any statistically significant differences in post-enrollment opt-out rates by rate, CARE/FERA status, climate region, and post-enrollment treatment. A t-test is a statistical test that is used to determine if the mean values of two populations differ – in this case the mean opt-out rate for the notification cells was examined. If they key output of the t-test, the p-value, is below 0.100 then the difference in opt-out rates is determined to be statistically significant at the 90% confidence level.

4 Load Impacts

This report section summarizes the load impacts for the two rate treatments tested by SCE. Load impacts were estimated for the peak and off-peak periods and for average hourly and daily energy use for the following rates, customer segments, and climate regions:

- For all customers on each rate for the pilot as a whole and for all customers in each climate region (hot, moderate, cool, and Climate Zone 10)
- Non-CARE/FERA customers on each rate for the pilot as a whole and across climate regions (hot, moderate, cool, and Climate Zone 10) and CARE/FERA customers in the moderate and cool climate regions.

As discussed above, it's imperative that comparisons across regions and climate zones are cognizant of the differences in the mix of customers across regions. That is, because CARE/FERA customers are not included in the two hot climate regions, comparisons of load impacts across the two hot and two cooler regions reflect not only differences due to climate but also differences in the mix of customers, with both CARE/FERA and non-CARE/FERA customers in the moderate and cool regions and only non-CARE/FERA customers in the two hot regions. Similarly, comparisons across customer segments for the service territory as a whole do not just reflect differences in behavior between CARE/FERA and non-CARE/FERA customers but also differences in the mix of customers across climate regions. The all utility impacts are representative of what SCE can expect at the service territory level for full roll out of the rates, because CARE/FERA customers will not be defaulted in the hot climate regions for full roll out. But it is not appropriate to claim that a difference of, say, 50% between CARE/FERA and non-CARE/FERA customers at the service territory level accurately reflects a difference in behavior between the two groups of customers, all other factors held constant. In addition to the above, Nexant estimated incremental load impacts for customers that received the Enhanced (high-touch) ME&O treatment for each rate and for each climate region.

Load impacts are reported here for each rate period for the average weekday, average weekend, and average monthly peak day for the summer months of June through September 2018. Impacts are reported for each rate, climate region and customer segment summarized above.

Underlying the values presented in the report are electronic tables that contain estimates for each hour of the day for each day type, segment, and climate region for the summer; and for each month separately. These values are contained in Excel spreadsheets that are available upon request through the CPUC. Figure 4-1 shows an example of the content of these electronic tables for SCE Rate 4 for all eligible customers in the service territory. Pull down menus in the upper left hand corner allow users to select different customer segments, climate regions, day types (e.g., weekdays, weekends, monthly peak day) and time periods (individual months or seasons).

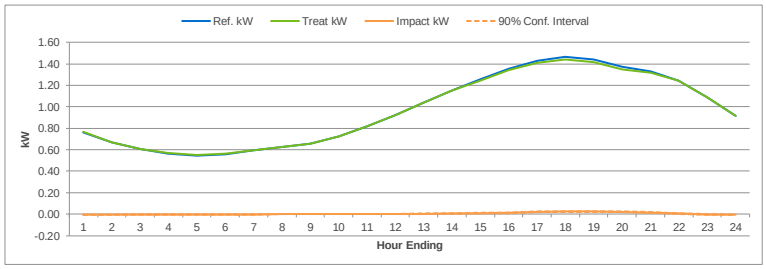
The remainder of this section is organized by rate treatment—load impacts are presented for each relevant customer segment and climate region for each of the two rates. Following this discussion, incremental impacts of enhanced E&O over the standard E&O communication are

presented. Finally, comparisons of load impacts across the two TOU rates are made for the common hours (5 PM to 8 PM) that are shared across rates.

Figure 4-1: Example of Content of Electronic Tables Underlying Load Impacts Summarized in this Report (SCE Rate 4, Average Summer 2018 Weekday, All Customers)

Rate	Rate 4
Segment	All
Time Period	Summer
Day Type	Average Weekday

Period	Control Customers	Treatment Customers	Ref. kW	Treat kW	Impact kW	90% Conf. Interval		% Impact
Peak	184,208	148,571	1.41	1.39	0.02	0.02	0.02	1.5%
Mid-Peak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Off-Peak	184,208	148,571	0.85	0.85	0.00	0.00	0.00	0.1%
Super Off-Peak	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Day (kWh)	**184,208**	**148,571**	**23.14**	**23.02**	**0.12**	**0.11**	**0.13**	**0.5%**



Hour	Period	Ref. kW	Treat kW	Impact kW	90% Conf. Interval		% Impact
1	Off-Peak	0.76	0.77	0.00	-0.01	0.00	-0.5%
2	Off-Peak	0.67	0.67	0.00	-0.01	0.00	-0.6%
3	Off-Peak	0.61	0.61	0.00	0.00	0.00	-0.5%
4	Off-Peak	0.57	0.57	0.00	0.00	0.00	-0.4%
5	Off-Peak	0.55	0.55	0.00	0.00	0.00	-0.4%
6	Off-Peak	0.56	0.56	0.00	0.00	0.00	-0.5%
7	Off-Peak	0.59	0.60	0.00	0.00	0.00	-0.5%
8	Off-Peak	0.62	0.62	0.00	0.00	0.00	0.0%
9	Off-Peak	0.65	0.65	0.00	0.00	0.00	0.1%
10	Off-Peak	0.72	0.72	0.00	0.00	0.00	0.1%
11	Off-Peak	0.82	0.81	0.00	0.00	0.00	0.2%
12	Off-Peak	0.92	0.92	0.00	0.00	0.00	0.1%
13	Off-Peak	1.04	1.04	0.00	0.00	0.01	0.3%
14	Off-Peak	1.15	1.15	0.01	0.00	0.01	0.5%
15	Off-Peak	1.25	1.25	0.01	0.01	0.01	0.7%
16	Off-Peak	1.35	1.34	0.01	0.01	0.01	0.9%
17	Peak	1.43	1.41	0.02	0.02	0.02	1.5%
18	Peak	1.47	1.44	0.02	0.02	0.03	1.7%
19	Peak	1.44	1.42	0.02	0.02	0.03	1.7%
20	Peak	1.37	1.35	0.02	0.02	0.02	1.6%
21	Peak	1.33	1.32	0.02	0.01	0.02	1.2%
22	Off-Peak	1.25	1.24	0.00	0.00	0.01	0.4%
23	Off-Peak	1.09	1.09	0.00	0.00	0.00	-0.2%
24	Off-Peak	0.91	0.92	0.00	-0.01	0.00	-0.4%

4.1 Summary of Pilot Rates

Figures 2-4 and 2-5 in Section 2 summarized the rate periods and prices for Rates 4 and 5. Importantly, the prices shown in those figures and discussed below do not reflect the baseline credit of 7¢/kWh that applies to each rate.

Rate 4 has two rate periods on summer weekdays and three on winter weekdays. The peak and mid-peak period on Rate 4 is the same all year long and runs from 4 PM to 9 PM. The peak to off-peak price ratio (ignoring the baseline credit) is 1.8 to 1 in summer and mid-peak to super off-peak ratio is 1.75 to 1 in winter. Customers on SCE's Rate 4 pay super off-peak prices on weekends in the winter. In summer, off-peak prices are in effect on weekends from 9 PM to 4 PM, which is the time-period covered by the combination of off-peak and super off-peak prices during winter.

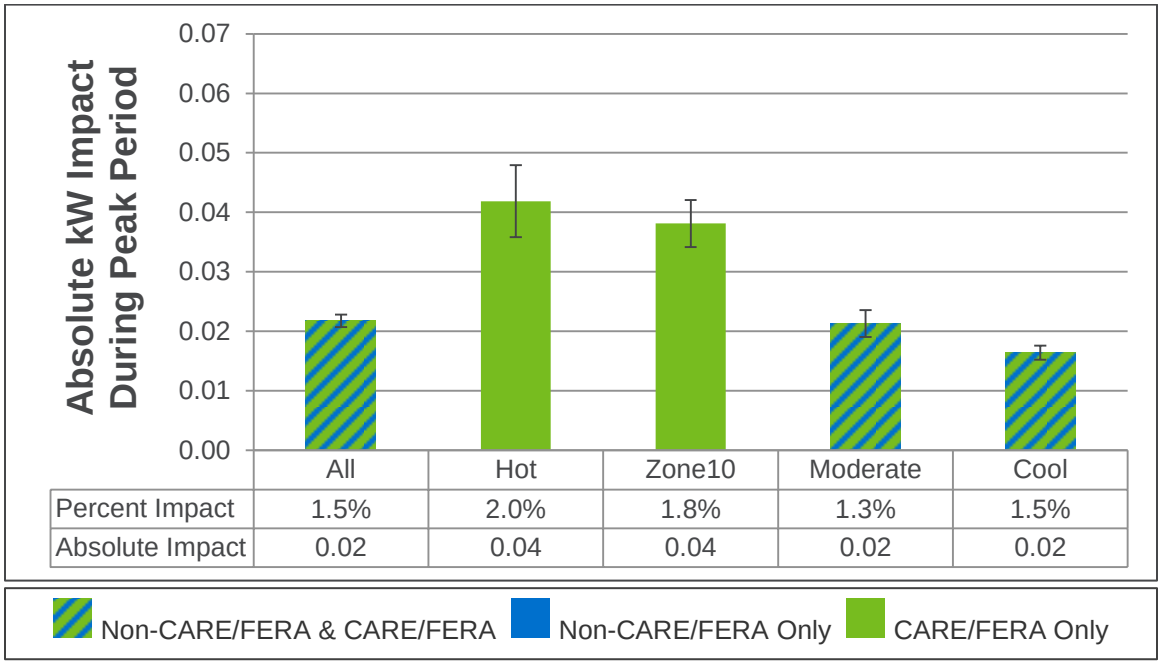
SCE's Rate 5 has two rate periods on summer weekdays and three on winter weekdays, the same structure as Rate 4. Compared with Rate 4, Rate 5 has a much shorter peak period but a slightly higher peak price in summer months (47¢/kWh for Rate 5 versus 40¢/kWh for Rate 4) and slightly high mid-peak price in winter months (29¢/kWh for Rate 5 versus 28¢/kWh for Rate 4). The peak period runs from 5 PM to 8 PM. Rate 5 also features a super off-peak price of roughly 16¢/kWh between 8 AM and 5 PM on weekends during winter. The ratio of peak to off-peak prices in the summer is roughly 2.1 to 1. In winter, the mid-peak to super off-peak price ratio is roughly 1.8 to 1. On weekends, customers pay the off-peak price between 8 PM and 8 AM and the super off-peak price during the same overnight hours as on weekdays, from 8 AM to 5 PM. For the two rates, the summer season covers the months of June through September. The winter season is October through May.

4.2 Rate 4

Figure 4-2 shows the average peak period load reduction in absolute terms for Rate 4 for SCE's service territory as a whole and for each climate region. The lines bisecting the top of each bar in the figure show the 90% confidence band for each estimate. If the confidence band includes

0, it means that the estimated load impact is not statistically different from 0 at the 90% level of confidence. If the confidence bands for two bars do not overlap, it means that the observed difference in the load impacts is statistically significant. If they do overlap, it does not necessarily mean that the difference is not statistically significant.[9] In these cases, t-tests were calculated to determine whether the difference is statistically significant.[10] Bars with blue and green stripes indicate that the segment includes a combination of CARE/FERA customers and non-CARE/FERA customers, while solid green bars represent segments that are non-CARE/FERA only. Solid blue bars represent segments that are CARE/FERA customers only. However, it is important to note that the "All" category includes non-CARE/FERA customers from all climate regions but CARE/FERA customers only from the moderate and cool climate regions. As a result, the "All" estimates cannot be directly compared to the "Moderate" and "Cool" estimates.

Figure 4-2: Average Peak Period Load Impacts for SCE Rate 4 by Climate Region (Positive values represent load reductions)



As seen in Figure 4-2, the average peak-period load impact for the service territory as a whole and for each climate region is statistically significant at the 90% level of confidence. On average, default pilot participants across SCE's service territory on Rate 4 reduced peak-period electricity use by 1.5%, or 0.02 kW, across the five-hour peak period from 4 PM to 9 PM. Keeping in mind that differences across regions reflect both differences in climate and the presence or absence of CARE/FERA customers, the average peak-period load reduction ranges from a high of 2.0% and 0.04 kW in the hot climate region to a low of about 1.5% and 0.02 kW in the cool climate region. The difference in load impacts between the moderate and cool climate regions is small but statistically significant while the difference in impacts in Climate Zone 10 and the hot region are not statistically significant.

[9] For further discussion of this topic, see https://www.cscu.cornell.edu/news/statnews/stnews73.pdf.

[10] The test was applied at the 90% confidence level which means that a t-value exceeding 1.65 indicates statistical significance.

Table 4-1 shows the average percent and absolute hourly load impacts for each period for weekdays, weekends, and for the average monthly system peak day for the SCE service territory as a whole and for the participant population in each climate region. The percent reduction equals the load impact in absolute terms (kW) divided by the reference load. Shaded cells in the table contain load impact estimates that are not statistically significant at the 90% confidence level. The percentage and absolute values in the first row of Table 4-1, which represent the load impacts in the peak period on the average weekday, equal the values shown in Figure 4-2, discussed above.

The reference loads shown in Table 4-1 represent estimates of what customers on the TOU rate would have used if they had not responded to the price signals contained in the TOU tariff. As seen in the table, average hourly usage during the peak period is roughly 1.41 kW for the service territory as a whole, and around 0.96 kW over the 24 hour average weekday. In the hot climate region and Climate Zone 10, average usage in the peak period is greater at 2.06 kW and 2.13 kW, respectively. Average usage in the moderate climate region is 1.63 kW and in the cool region it is 1.07 kW, which is roughly half what it is in the hot region. However, the cool climate region includes CARE/FERA customers while the hot climate region does not.

The monthly system peak day estimates represent the average across the four weekdays, one in each summer month, when SCE's system peaked in 2018. Peak period reference loads are higher on these days than on the average weekday. For the service territory as a whole, the percent reduction in monthly system peak day peak period loads (1.4%) is slightly lower than the load reduction on the average weekday (1.5%); however, the absolute load reduction (0.03 kW) is slightly higher than on the average weekday (0.02 kW). Customers had small but statistically significant daily usage decreases on the average weekend even though off-peak prices were in effect for the majority of weekend hours and mid-peak prices were in effect for the remaining hours.

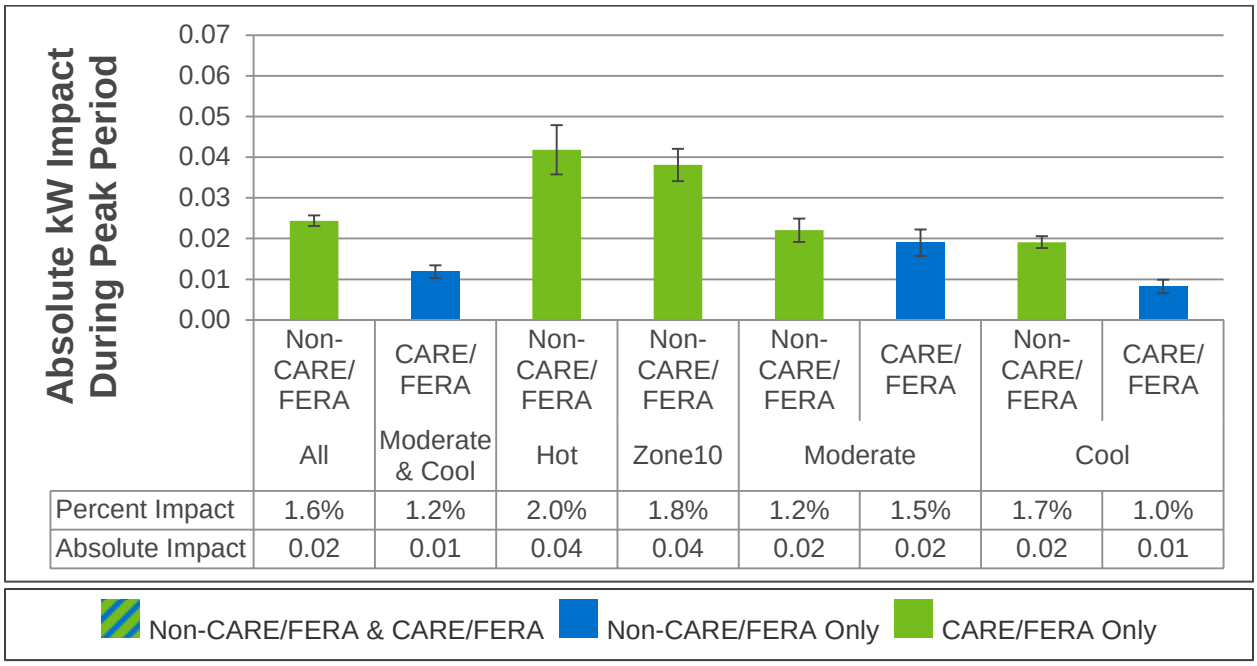
Table 4-1: Average Hourly Load Impacts by Climate Region Rate Period and Day Type for SCE Rate 4
(Positive values represent load reductions, negative values represent load increases)

Rate 4																	
Day Type	Period	Hours	All			Hot			Zone10			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	1.41	0.02	1.5%	2.06	0.04	2.0%	2.13	0.04	1.8%	1.63	0.02	1.3%	1.07	0.02	1.5%
	Off-Peak	9 PM to 4 PM	0.85	0.00	0.1%	1.21	0.01	0.8%	1.17	0.00	-0.2%	0.92	0.00	-0.2%	0.70	0.00	0.2%
	Day	All Hours	0.96	0.00	0.5%	1.38	0.02	1.2%	1.37	0.01	0.5%	1.07	0.00	0.3%	0.78	0.00	0.6%
Average Weekend	Mid-Peak	4 PM to 9 PM	1.37	0.02	1.3%	1.99	0.03	1.5%	2.07	0.03	1.5%	1.57	0.02	1.1%	1.05	0.01	1.3%
	Off-Peak	9 PM to 4 PM	0.87	0.00	0.1%	1.22	0.01	0.7%	1.21	0.00	-0.2%	0.94	0.00	-0.1%	0.72	0.00	0.2%
	Day	All Hours	0.97	0.00	0.5%	1.38	0.01	1.0%	1.39	0.00	0.3%	1.07	0.00	0.2%	0.79	0.00	0.5%
Monthly System Peak	Peak	4 PM to 9 PM	1.85	0.03	1.4%	2.29	0.03	1.3%	2.93	0.06	1.9%	2.24	0.03	1.2%	1.37	0.02	1.3%
	Off-Peak	9 PM to 4 PM	1.01	0.00	0.1%	1.29	0.01	0.9%	1.51	0.00	-0.1%	1.14	0.00	0.0%	0.81	0.00	0.1%
	Day	All Hours	1.19	0.01	0.6%	1.50	0.02	1.0%	1.81	0.01	0.6%	1.37	0.01	0.4%	0.92	0.00	0.5%

* A shaded cell indicates estimate is not statistically significant

Figure 4-3 shows the absolute peak period load impacts for Rate 4 for CARE/FERA and non-CARE/FERA customers for the service territory as a whole and for each climate region. Non-CARE/FERA segments are shaded with green while CARE/FERA segments are shaded in blue. In the cool climate region, both the percent and absolute load impacts in the peak period differ by a statistically significant amount and impacts are smaller for CARE/FERA customers than for non-CARE/FERA customers. In the moderate climate region, non-CARE/FERA customers produced larger percentage load reductions compared to non-CARE/FERA customers, but there is no statistically significant difference in the percentage or absolute impacts between the two customer segments. There is a statistically significant difference in load impacts between CARE/FERA and non-CARE/FERA customers at the service territory level but this comparison reflects both potential differences in behavior across the two segments as well as the fact that the non-CARE/FERA estimate includes customers in the hotter climate regions where absolute load impacts are typically larger. As such, this is not a valid comparison if the objective is to reflect only behavioral differences between the two customer segments.

Figure 4-3: Average Peak Period Impacts for SCE Rate 4 by Climate Region & CARE/FERA Status (Positive values represent load reductions)



Percent Impact	1.6%	1.2%	2.0%	1.8%	1.2%	1.5%	1.7%	1.0%
Absolute Impact	0.02	0.01	0.04	0.04	0.02	0.02	0.02	0.01

Table 4-2 shows the estimated load impacts for each day type for the different rate period for the service territory as a whole and by climate region for non-CARE/FERA customers, and Table 4-3 shows the same segment values for CARE/FERA customers. For the service territory as a whole, non-CARE/FERA customers have average peak-period reference loads that are larger than CARE/FERA customers (1.52 kW for non-CARE/FERA and 0.97 kW for CARE/FERA), however the CARE/FERA segment only includes customers in the moderate and cool climate regions. Non-CARE/FERA customers have larger average usage rates across all climate regions and for daily electricity usage on average summer weekdays, weekends, and on monthly system peak days.

For the majority of customer segments and climate regions, there was a small but statistically significant reduction in daily electricity consumption. Put differently, the observed reduction in peak-period energy use was not completely offset by load shifting to non-peak time periods. Indeed, most segments and climate regions showed a small reduction in usage in the off-peak period rather than an increase which would be observed if the amount of load shifting was significant. CARE/FERA customers in the moderate and cool climate regions decreased average daily usage on weekdays by 0.7%, whereas non-CARE/FERA customers across all climate regions decreased their usage by 0.5%. On monthly system peak days, non-CARE/FERA customers reduced daily electricity use by 0.6% and CARE/FERA decreased their overall usage by 0.5%. CARE/FERA customers displayed larger average load reductions than non-CARE/FERA customers on off-peak periods overall and for every climate region on average weekdays and average weekends.

Table 4-2: Average Hourly Load Impacts by Rate Period and Day Type for SCE Rate 4 by Climate Region -- Non-CARE/FERA Customers
(Positive values represent load reductions, negative values represent load increases)

Rate 4																	
Day Type	Period	Hours	All - Non-CARE/FERA			Hot - Non-CARE/FERA			Zone10 - Non-CARE/FERA			Moderate - Non-CARE/FERA			Cool - Non-CARE/FERA		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	1.52	0.02	1.6%	2.06	0.04	2.0%	2.13	0.04	1.8%	1.77	0.02	1.2%	1.15	0.02	1.7%
	Off-Peak	9 PM to 4 PM	0.91	0.00	0.0%	1.21	0.01	0.8%	1.17	0.00	-0.2%	0.99	0.00	-0.5%	0.75	0.00	0.1%
	Day	All Hours	1.04	0.00	0.5%	1.38	0.02	1.2%	1.37	0.01	0.5%	1.16	0.00	0.1%	0.83	0.00	0.6%
Average Weekend	Mid-Peak	4 PM to 9 PM	1.49	0.02	1.3%	1.99	0.03	1.5%	2.07	0.03	1.5%	1.72	0.02	0.9%	1.13	0.02	1.4%
	Off-Peak	9 PM to 4 PM	0.93	0.00	0.0%	1.22	0.01	0.7%	1.21	0.00	-0.2%	1.01	0.00	-0.4%	0.76	0.00	0.2%
	Day	All Hours	1.04	0.00	0.4%	1.38	0.01	1.0%	1.39	0.00	0.3%	1.16	0.00	0.0%	0.84	0.00	0.5%
Monthly System Peak	Peak	4 PM to 9 PM	2.02	0.03	1.4%	2.29	0.03	1.3%	2.93	0.06	1.9%	2.46	0.03	1.1%	1.49	0.02	1.3%
	Off-Peak	9 PM to 4 PM	1.09	0.00	0.2%	1.29	0.01	0.9%	1.51	0.00	-0.1%	1.23	0.00	-0.1%	0.86	0.00	0.2%
	Day	All Hours	1.28	0.01	0.6%	1.50	0.02	1.0%	1.81	0.01	0.6%	1.49	0.00	0.3%	0.99	0.01	0.5%

* A shaded cell indicates estimate is not statistically significant

Table 4-3: Average Hourly Load Impacts by Rate Period and Day Type for SCE Rate 4 by Climate Region -- CARE/FERA Customers (Positive values represent load reductions, negative values represent load increases)

Rate 4																	
Day Type	Period	Hours	Moderate & Cool - CARE/FERA			Hot - CARE/FERA			Zone10 - CARE/FERA			Moderate - CARE/FERA			Cool - CARE/FERA		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	4 PM to 9 PM	0.97	0.01	1.2%	N/A	N/A	N/A	N/A	N/A	N/A	1.23	0.02	1.5%	0.83	0.01	1.0%
	Off-Peak	9 PM to 4 PM	0.62	0.00	0.5%	N/A	N/A	N/A	N/A	N/A	N/A	0.72	0.01	0.9%	0.57	0.00	0.3%
	Day	All Hours	0.69	0.01	0.7%	N/A	N/A	N/A	N/A	N/A	N/A	0.83	0.01	1.1%	0.62	0.00	0.5%
Average Weekend	Mid-Peak	4 PM to 9 PM	0.92	0.01	1.3%	N/A	N/A	N/A	N/A	N/A	N/A	1.18	0.02	1.8%	0.79	0.01	1.1%
	Off-Peak	9 PM to 4 PM	0.63	0.00	0.5%	N/A	N/A	N/A	N/A	N/A	N/A	0.74	0.01	0.9%	0.58	0.00	0.3%
	Day	All Hours	0.69	0.01	0.8%	N/A	N/A	N/A	N/A	N/A	N/A	0.83	0.01	1.1%	0.62	0.00	0.5%
Monthly System Peak	Peak	4 PM to 9 PM	1.24	0.02	1.4%	N/A	N/A	N/A	N/A	N/A	N/A	1.66	0.02	1.5%	1.01	0.01	1.4%
	Off-Peak	9 PM to 4 PM	0.73	0.00	0.1%	N/A	N/A	N/A	N/A	N/A	N/A	0.89	0.00	0.5%	0.64	0.00	-0.1%
	Day	All Hours	0.83	0.00	0.5%	N/A	N/A	N/A	N/A	N/A	N/A	1.05	0.01	0.8%	0.72	0.00	0.3%

* A shaded cell indicates estimate is not statistically significant

4.3 Rate 5

SCE's Rate 5 has two rate periods on summer weekdays, and two rate periods on summer weekends, the same structure as Rate 4. Rate 5 peak period prices are higher than for Rate 4 but the peak period is only three hours, from 5 PM to 8 PM, whereas the Rate 4 peak period is five hours, from 4 PM to 9 PM. The Rate 5 peak price is 47.0¢/kWh for non-CARE/FERA customers and the off-peak price of 22¢/kWh on summer weekdays from hours 8 PM to 5 PM, which is the same price as the off-peak price for Rate 4.

Figure 4-4 shows the peak period load reductions on average weekdays for Rate 5. All load reductions are statistically significant at the 90% confidence level. The load reductions for the SCE territory as a whole, 2.0% or 0.03 kW are larger than those for Rate 4 (1.5% or 0.02 kW). The difference in average hourly peak period load reductions is statistically significant in both absolute and percentage terms. Load impacts were greatest in the Climate Zone 10 region (2.4% or 0.05 kW) although there is no statistically significant difference in absolute load impacts between the hot zone and Climate Zone 10. On the other hand, the difference in the absolute load impacts for all customers in the moderate and cool regions is statistically significant. Indeed, the absolute load reduction in the moderate region is twice as large as in the cool region, although the difference in the percentage impacts is not as great.

Figure 4-4: Average Peak Period Load Impacts for SCE Rate 5 by Climate Region (Positive values represent load reductions)

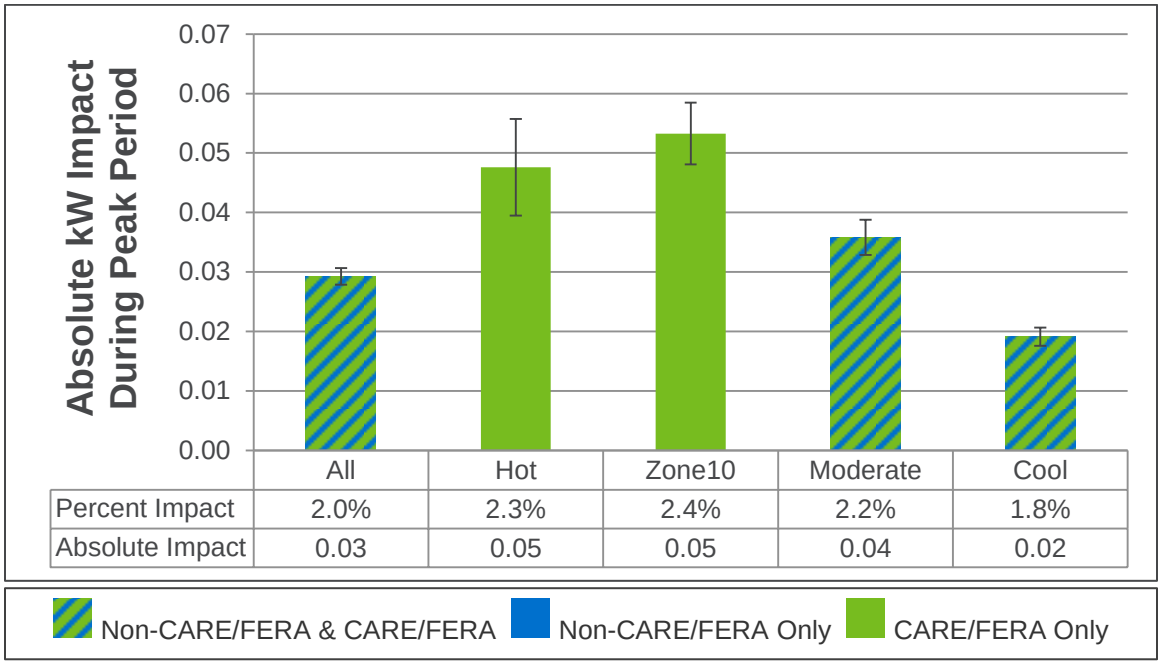


Table 4-4 presents estimates of load impacts for all relevant rate periods and day types for Rate 5 at the aggregate and climate region level. Average reference load usage was 1.43 kW at the full pilot level during the peak time on an average weekday. The highest demand estimates were observed in Climate Zone 10 on monthly system peak days during the peak period with a reference load of 2.98 kW.

The Climate Zone 10 and hot climate regions had largest percentage reductions for average weekday (2.4% and 2.3%) respectively (but these segments do not include CARE/FERA customers). The cool climate region had the lowest load impacts and average load usage during the peak for average weekdays, average weekends, and monthly system peak days. The average reduction in daily electricity use was statistically significant overall and in each climate region for every day type.

Table 4-4: Average Hourly Load Impacts by Climate Region, Rate Period and Day Type for SCE Rate 5 (Positive values represent load reductions, negative values represent load increases)

Rate 5																	
Day Type	Period	Hours	All			Hot			Zone10			Moderate			Cool		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	5 PM to 8 PM	1.43	0.03	2.0%	2.11	0.05	2.3%	2.17	0.05	2.4%	1.65	0.04	2.2%	1.08	0.02	1.8%
	Off-Peak	8 PM to 5 PM	0.90	0.00	0.3%	1.28	0.00	0.2%	1.26	0.00	0.2%	0.98	0.00	0.4%	0.74	0.00	0.3%
	Day	All Hours	0.96	0.01	0.0%	1.38	0.01	0.0%	1.37	0.01	0.0%	1.07	0.01	0.0%	0.78	0.00	0.0%
Average Weekend	Mid-Peak	5 PM to 8 PM	1.38	0.02	1.6%	2.03	0.04	1.7%	2.10	0.04	1.7%	1.59	0.03	1.9%	1.05	0.01	1.3%
	Off-Peak	8 PM to 5 PM	0.91	0.00	0.3%	1.29	0.00	0.0%	1.28	0.00	0.0%	1.00	0.00	0.5%	0.75	0.00	0.2%
	Day	All Hours	0.97	0.00	0.0%	1.38	0.00	0.0%	1.39	0.00	0.0%	1.07	0.01	0.0%	0.79	0.00	0.0%
Monthly System Peak Day	Peak	5 PM to 8 PM	1.88	0.04	2.0%	2.33	0.05	2.1%	2.98	0.07	2.2%	2.28	0.06	2.4%	1.38	0.02	1.7%
	Off-Peak	8 PM to 5 PM	1.09	0.00	0.3%	1.38	0.00	0.3%	1.64	0.00	0.2%	1.24	0.00	0.4%	0.86	0.00	0.2%
	Day	All Hours	1.19	0.01	0.0%	1.50	0.01	0.0%	1.81	0.01	0.0%	1.37	0.01	0.0%	0.92	0.00	0.0%

* A shaded cell indicates estimate is not statistically significant

Figure 4-5 shows the peak period load reductions on weekdays for non-CARE/FERA and CARE/FERA customers. As noted with Rate 4, there are no CARE/FERA customers in the hot or Climate Zone 10 regions. In both the moderate and cool climate regions, non-CARE/FERA load reductions are larger than CARE/FERA load reductions in both absolute and percentage terms. These differences are statistically significant in absolute terms in both climate regions and in percentage terms in the cool climate region. Indeed, the absolute load reductions are nearly twice as large for non-CARE/FERA customers compared with CARE/FERA customers in these two climate regions.

Figure 4-5: Average Peak Period Impacts for SCE Rate 5 by Climate Region & CARE/FERA Status (Positive values represent load reductions)

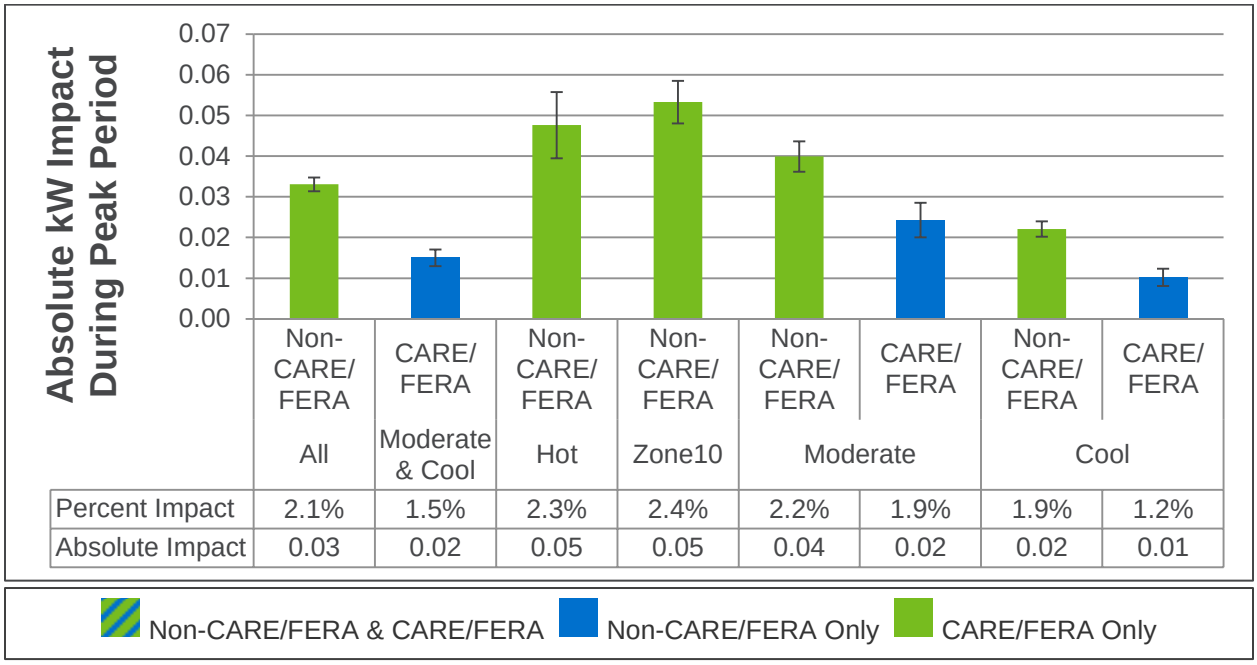


Table 4-5 and Table 4-6 show the load impacts for each rate period and day type for Rate 5 at the aggregate level and across climate regions. Non-CARE/FERA customers had higher average load and load reductions during peak times across all climate regions on average weekdays, weekends and monthly system peak days. An interesting finding is that the load impacts on all off-peak periods were greater for the CARE/FERA group than the non-CARE/FERA group across the four climate regions and the different day types. No values are reported for the hot and Climate Zone 10 regions for CARE/FERA customers as the pilot didn't include these populations.

Non-CARE/FERA customers had statistically significant reductions in average daily demand across most day types in each climate region except the cool climate region. The greatest daily reductions occurred in the hot climate region and Climate Zone 10. On the average weekday, these customers reduced their average demand by 0.6%. CARE/FERA customers also had average daily demand reductions, generally equal to less than 0.1% but statistically significant.

Table 4-5: Average Hourly Load Impacts by Rate Period and Day Type for SCE Rate 5 by Climate Region -- Non-CARE/FERA Customers (Positive values represent load reductions, negative values represent load increases)

Rate 5																	
Day Type	Period	Hours	All - Non-CARE/FERA			Hot - Non-CARE/FERA			Zone10 - Non-CARE/FERA			Moderate - Non-CARE/FERA			Cool - Non-CARE/FERA		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	5 PM to 8 PM	1.55	0.03	2.1%	2.11	0.05	2.3%	2.17	0.05	2.4%	1.81	0.04	2.2%	1.16	0.02	1.9%
	Off-Peak	8 PM to 5 PM	0.96	0.00	0.2%	1.28	0.00	0.2%	1.26	0.00	0.2%	1.06	0.00	0.2%	0.78	0.00	0.2%
	Day	All Hours	1.04	0.01	0.0%	1.38	0.01	0.6%	1.37	0.01	0.6%	1.16	0.01	0.0%	0.83	0.00	0.0%
Average Weekend	Mid-Peak	5 PM to 8 PM	1.50	0.02	1.6%	2.03	0.04	1.7%	2.10	0.04	1.7%	1.74	0.03	1.8%	1.13	0.02	1.3%
	Off-Peak	8 PM to 5 PM	0.98	0.00	0.2%	1.29	0.00	0.0%	1.28	0.00	0.0%	1.08	0.00	0.3%	0.80	0.00	0.2%
	Day	All Hours	1.04	0.00	0.0%	1.38	0.00	0.3%	1.39	0.00	0.3%	1.16	0.01	0.0%	0.84	0.00	0.0%
Monthly System Peak Day	Peak	5 PM to 8 PM	2.05	0.04	2.2%	2.33	0.05	2.1%	2.98	0.07	2.2%	2.50	0.07	2.7%	1.51	0.03	1.7%
	Off-Peak	8 PM to 5 PM	1.17	0.00	0.2%	1.38	0.00	0.3%	1.64	0.00	0.2%	1.34	0.00	0.2%	0.92	0.00	0.2%
	Day	All Hours	1.28	0.01	0.0%	1.50	0.01	0.7%	1.81	0.01	0.6%	1.49	0.01	0.0%	0.99	0.00	0.0%

* A shaded cell indicates estimate is not statistically significant

Table 4-6: Average Hourly Load Impacts by Rate Period and Day Type for SCE Rate 5 by Climate Region -- CARE/FERA Customers (Positive values represent load reductions, negative values represent load increases)

Rate 5																	
Day Type	Period	Hours	Moderate & Cool - CARE/FERA			Hot - CARE/FERA			Zone10 - CARE/FERA			Moderate - CARE/FERA			Cool - CARE/FERA		
			Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact	Ref. kW	Impact kW	% Impact
Average Weekday	Peak	5 PM to 8 PM	0.97	0.02	1.5%	N/A	N/A	N/A	N/A	N/A	N/A	1.25	0.02	1.9%	0.83	0.01	1.2%
	Off-Peak	8 PM to 5 PM	0.65	0.00	0.8%	N/A	N/A	N/A	N/A	N/A	N/A	0.77	0.01	1.1%	0.59	0.00	0.5%
	Day	All Hours	0.69	0.01	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	0.83	0.01	0.1%	0.62	0.00	0.0%
Average Weekend	Mid-Peak	5 PM to 8 PM	0.92	0.01	1.5%	N/A	N/A	N/A	N/A	N/A	N/A	1.18	0.02	2.0%	0.79	0.01	1.1%
	Off-Peak	8 PM to 5 PM	0.66	0.00	0.7%	N/A	N/A	N/A	N/A	N/A	N/A	0.78	0.01	1.1%	0.60	0.00	0.4%
	Day	All Hours	0.69	0.01	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	0.83	0.01	0.1%	0.62	0.00	0.0%
Monthly System Peak Day	Peak	5 PM to 8 PM	1.25	0.02	1.3%	N/A	N/A	N/A	N/A	N/A	N/A	1.68	0.02	1.3%	1.01	0.01	1.3%
	Off-Peak	8 PM to 5 PM	0.77	0.00	0.6%	N/A	N/A	N/A	N/A	N/A	N/A	0.96	0.01	0.9%	0.67	0.00	0.4%
	Day	All Hours	0.83	0.01	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	1.05	0.01	0.0%	0.72	0.00	0.0%

* A shaded cell indicates estimate is not statistically significant

4.4 Post-enrollment Treatments

4.4.1 Enhanced E&O

SCE varied the education and outreach provided to participants who were on the two TOU rates. Half of the pilot participants on each rate received what SCE describes as enhanced education and outreach which had different formatting and content as summarized in Section 2.2. Figure 4-6 shows the average incremental impact attributable to the enhanced education and outreach at the aggregate level and for each climate region for Rate 4, while Figure 4-7 shows the average incremental impacts at the aggregate level and for each climate region for Rate 5. Positive values in the figure indicate an incremental increase in load reductions (e.g., load reductions are larger with enhanced education) while a negative value means load reductions were smaller for the enhanced education group relative to the less frequent communication. As seen, incremental impacts were not statistically significant in any of the climate regions.

Figure 4-6: Rate 4 Incremental Load Impacts from Enhanced E&O Treatment by Climate Region (Positive values represent larger load reductions for Enhanced E&O customers relative to Basic E&O Customers)

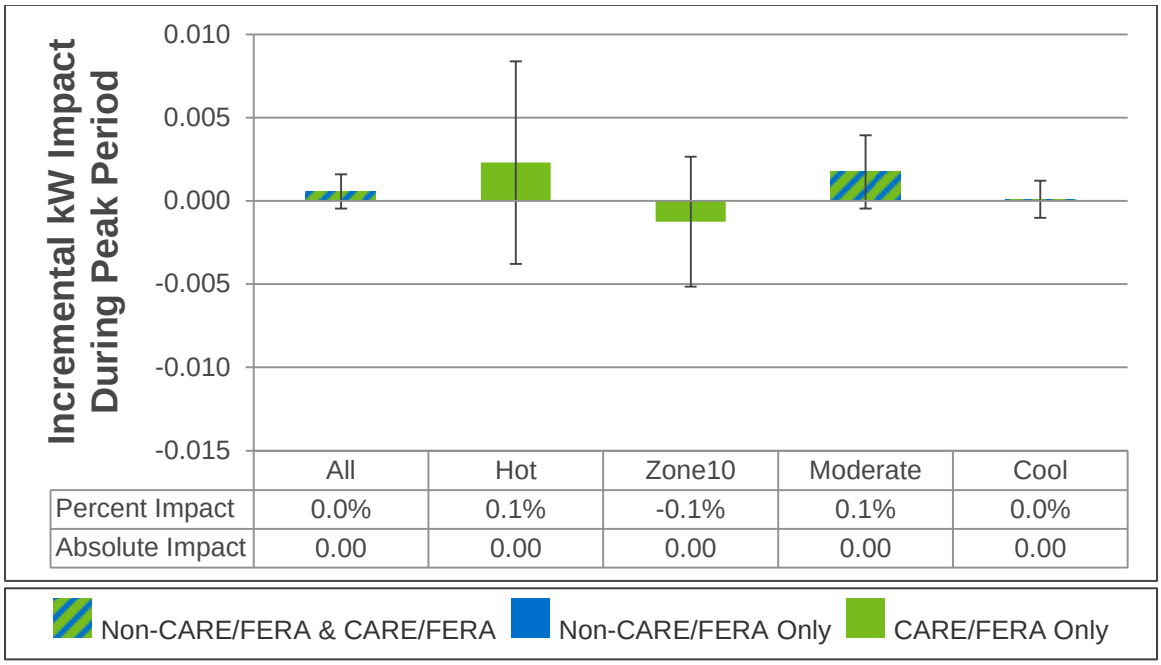


Figure 4-7: Rate 5 Incremental Load Impacts from Enhanced E&O Treatment by Climate Region (Positive values represent larger load reductions for Enhanced E&O customers relative to Basic E&O customers)

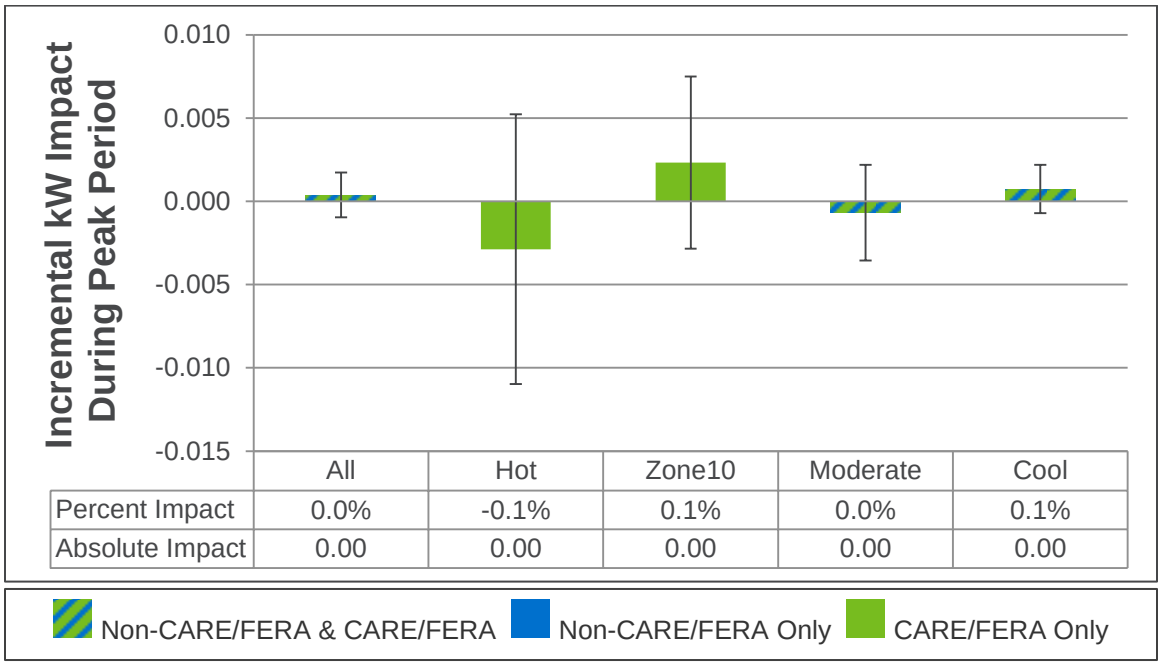
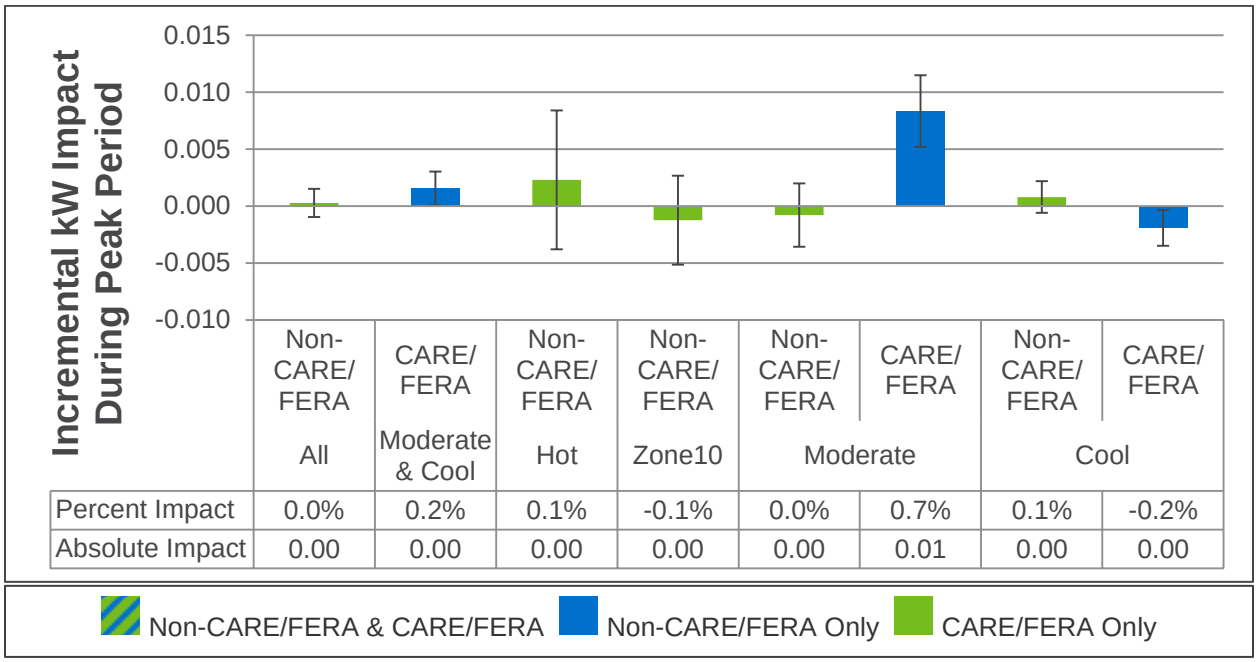


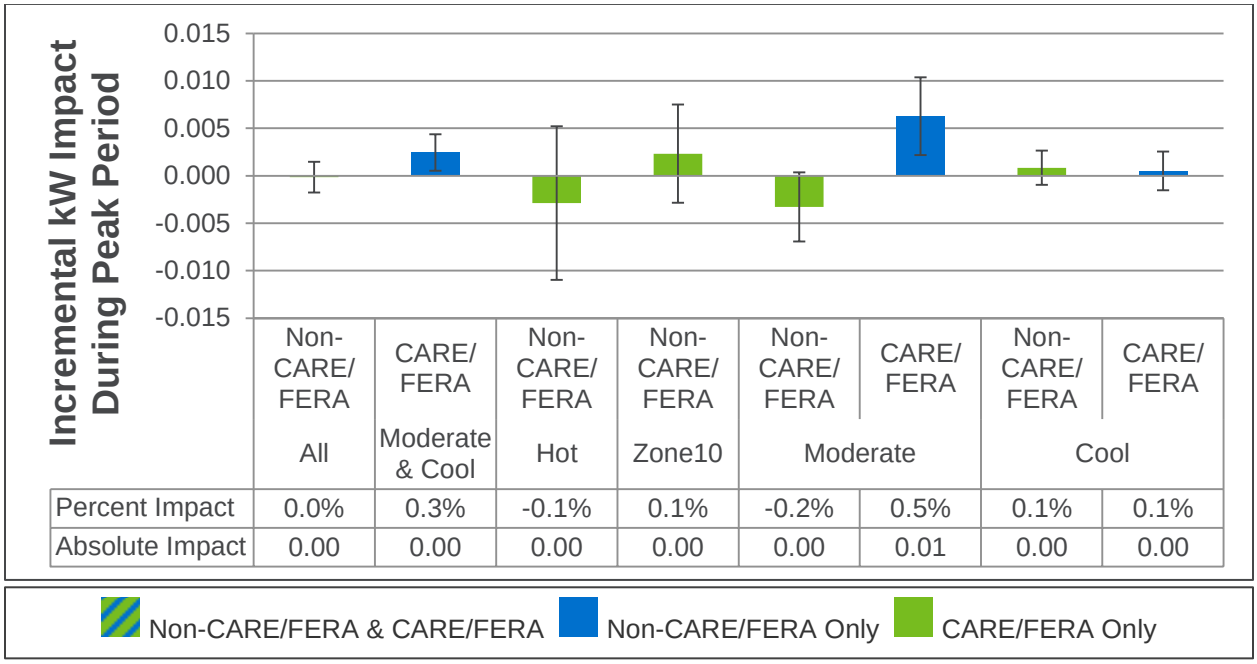
Figure 4-8 and Figure 4-9 display the average incremental peak period impact attributable to the enhanced education and outreach by CARE/FERA status for each climate region for Rate 4 and Rate 5, respectively. With one exception, there are no discernible differences in impacts between the enhanced and basic groups as the estimates shown are both negative and positive with almost no segments being statistically significant. The exception is the CARE/FERA moderate climate region segment where the enhanced education group experienced significant incremental load reductions relative to the non-enhanced group in both Rate 4 and Rate 5. Although the incremental savings were statistically significant, they were small (0.01 kW or 0.7%).

Figure 4-8: Rate 4 Incremental Peak Period Load Impacts from Enhanced E&O Treatment by Climate Region & CARE/FERA Status
(Positive values represent larger load reductions for Enhanced E&O customers relative to Basic E&O customers)



Percent Impact	0.0%	0.2%	0.1%	-0.1%	0.0%	0.7%	0.1%	-0.2%
Absolute Impact	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00

Figure 4-9: Rate 5 Incremental Load Impacts from Enhanced E&O Treatment by Climate Region & CARE/FERA Status (Positive values represent larger load reductions for Enhanced E&O customers relative to Basic E&O customers)



	Non-CARE/FERA All	CARE/FERA Moderate & Cool	Non-CARE/FERA Hot	Non-CARE/FERA Zone10	Non-CARE/FERA Moderate	CARE/FERA Moderate	Non-CARE/FERA Cool	CARE/FERA Cool
Percent Impact	0.0%	0.3%	-0.1%	0.1%	-0.2%	0.5%	0.1%	0.1%
Absolute Impact	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00

4.4.2 Level Payment Plan

As discussed in Section 2, the enrolled population on each of the default rates was segmented into two groups, those deemed to be most impacted by bill volatility and those who are not. The segment of customers impacted by bill volatility was considered to be income-constrained customers who were expected to experience increased seasonal bill differentials under the default TOU rate. This segment of customers was further divided into two equal groups, with one group receiving information on SCE's Level Payment Plan (LPP) as a means of managing month-to-month bill volatility.

The Pilot plan called for estimating the incremental enrollments in LPP that occurred as a result of the additional messaging and, if enrollment was large enough, to determine if load impacts differed between customers who were and were not on the LPP. However, among the group of approximately 52,000 pilot treatment customers who were deemed most impacted by bill volatility, only 40 enrolled in LPP after the launch of the pilot. As such, participation is not large enough to determine any differences in load impacts between LPP and non-LPP participants.

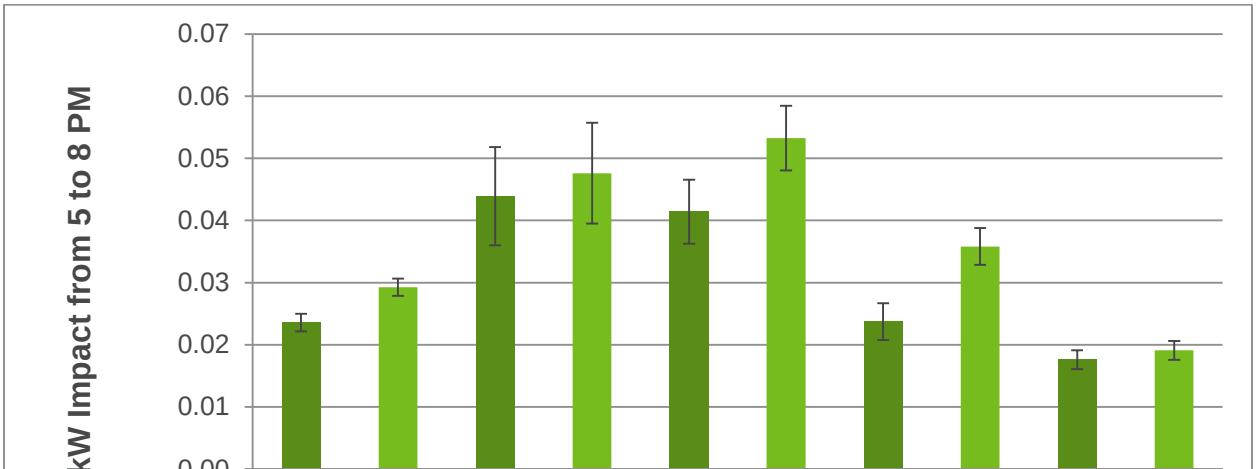
4.5 Comparison Across Rates

Figure 4-10 compares the load impacts for the two rates tested by SCE for the common set of peak-period hours from 5 PM to 8 PM for the entire summer of 2018. Using a common set of hours reduces differences in impacts across rates that might be due to differences in the number of hours included in the peak period or the timing of those hours. The hours from 5 PM to 8 PM define the peak period for SCE's Rate 5. Rate 4 has a five hour peak period, from 4 PM

to 9 PM and both tariffs have two rate periods in summer. The shorter duration of Rate 5 is offset by the higher peak price. Both Rate 4 and Rate 5 have the same baseline credit.

Customers on Rate 5, which had a shorter peak period with a higher peak period price, produced larger average load reductions than Rate 4 customers in every climate region during the common hours from 5 Pm to 8 PM, although not all differences were statistically significant. The largest difference was in the moderate climate region, where Rate 5 customers had absolute load reductions that were nearly twice as large as those provided by Rate 4 customers. There was also a statistically significant difference in load reductions in Climate Zone 10, although not in the hot or cool climate regions.

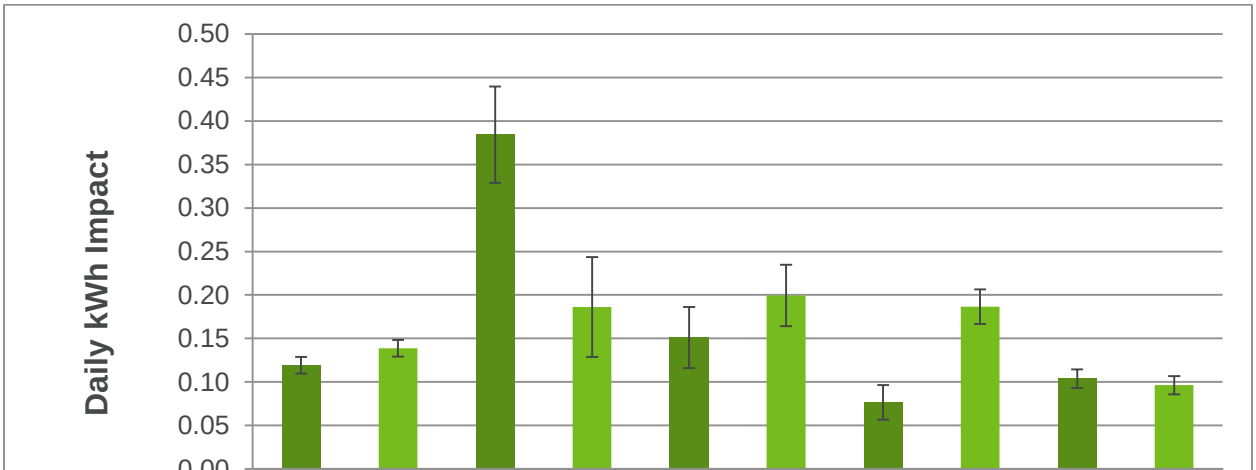
Figure 4-10: Average Impacts from 5 PM to 8 PM Across Rates



	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5
	All		Hot		Zone10		Moderate		Cool	
Percent Impact	1.7%	2.0%	2.1%	2.3%	1.9%	2.4%	1.4%	2.2%	1.6%	1.8%
Absolute Impact	0.02	0.03	0.04	0.05	0.04	0.05	0.02	0.04	0.02	0.02

Figure 4-11 presents the average daily kWh impacts for each rate during the summer 2018 period. Daily load reductions were roughly twice as large for Rate 5 when compared to Rate 4 in the moderate climate region but the opposite was true in the hot climate region, where the daily reduction for Rate 4 was roughly twice as large as for Rate 5. The differences in the cool climate region and Climate Zone 10 are not statistically significant. For the service territory as a whole, Rate 5 had a slightly larger, statistically significant load reduction compared with Rate 4.

Figure 4-11: Average Daily kWh Impacts Across Rates



	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5
	All		Hot		Zone10		Moderate		Cool	
Percent Impact	0.5%	0.6%	1.2%	0.6%	0.5%	0.6%	0.3%	0.7%	0.6%	0.5%
Absolute Impact	0.12	0.14	0.38	0.19	0.15	0.20	0.08	0.19	0.10	0.10

5 Structural Bill Impacts

This section summarizes the structural bill impact estimates for the two rate treatments tested by SCE. As discussed in Section 3.2, the impact of TOU rates on customers' bills is an important metric of interest to stakeholders, and a primary objective of the evaluation. Because bill impacts can vary rather significantly across seasons, and since this report is based only on usage for the summer season, this evaluation does not present behavioral impacts or total bill impacts. Those will be presented after customers have been on the new tariffs for a full year.

Structural bill impacts were estimated for the average month in summer, winter, and for the entire pre-treatment year. The proportions of structural benefiters, non-benefiters and customers in the neutral category (e.g., ±$3/month) are presented for each rate for CARE/FERA and non-CARE/FERA customers by climate region and for the pilot as a whole.

5.1 Rate 4

The structural benefiter analysis was conducted for the summer, winter and annual periods using pretreatment data from the treatment group for each rate and relevant customer segment. Annual impacts were based on monthly bill estimates from January 2017 through December 2017. Summer impacts were based on June 2017 through September 2017 and winter impacts were based on January 2017 through May 2017 and October 2017 through December 2017. Monthly bills for each treatment customer on their OAT and default TOU rate were provided by SCE. The difference in bills based on the TOU rate and the OAT determines if a customer is a structural benefiter, a structural non-benefiter, or falls in a neutral range defined as having a structural bill impact between ±$3.[11]

Results from the structural benefiter / non-benefiter analysis are presented in column graphs and shown as percentages for the summer season, winter season, and on an annual basis. For each rate and relevant segment, the percentage of customers who are non-benefiter, neutral (+/- $3), or benefiters based on their average monthly bills for the time period of interest are shown as individual columns. The three columns within each rate and segment combination total to 100%, thus showing the distribution of structural benefiters and non-benefiters for each rate and segment of interest.

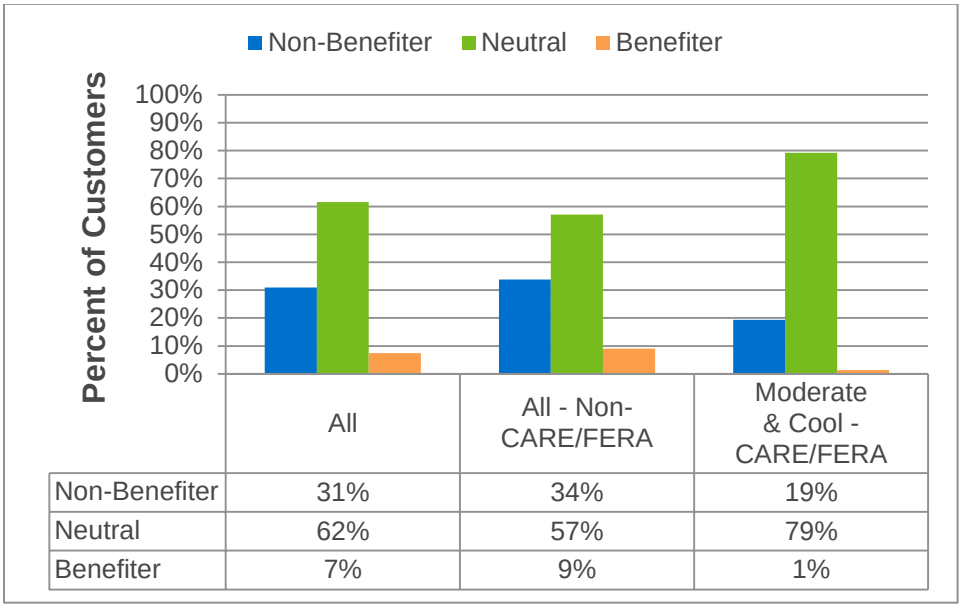
Figure 5-1 presents the outcome of the structural benefiter analysis for Rate 4 at the annual aggregate level across all climate regions for all customers as well as for CARE/FERA and non-CARE/FERA groups. Figure 5-2 and Figure 5-3 present the same data for the summer and winter rate periods.

At the annual level, slightly more than 60% of all customers were in the neutral column while almost 80% of CARE/FERA consumers in the moderate and cool climate regions had neutral bill impacts. Non-CARE/FERA customers across all climate regions had the greatest share of non-benefiters (34%), although a majority of customers were either benefiters or neutral. The observed difference in the distribution of bill impacts across customers segments is due in part

[11] See Section 3.2 for additional details on the methodology.

to differences in the distribution of customer segments across climate regions. The CARE/FERA distributions represent the moderate and cool regions only where the percent of customers that are neutral or structural benefiters is higher whereas the non-CARE/FERA distributions are influenced by the two hotter regions where the proportion of structural non-benefiters is higher.

Figure 5-1: Rate 4 – Annual Structural Benefiter / Non-Benefiter Analysis by CARE/FERA Status[12]

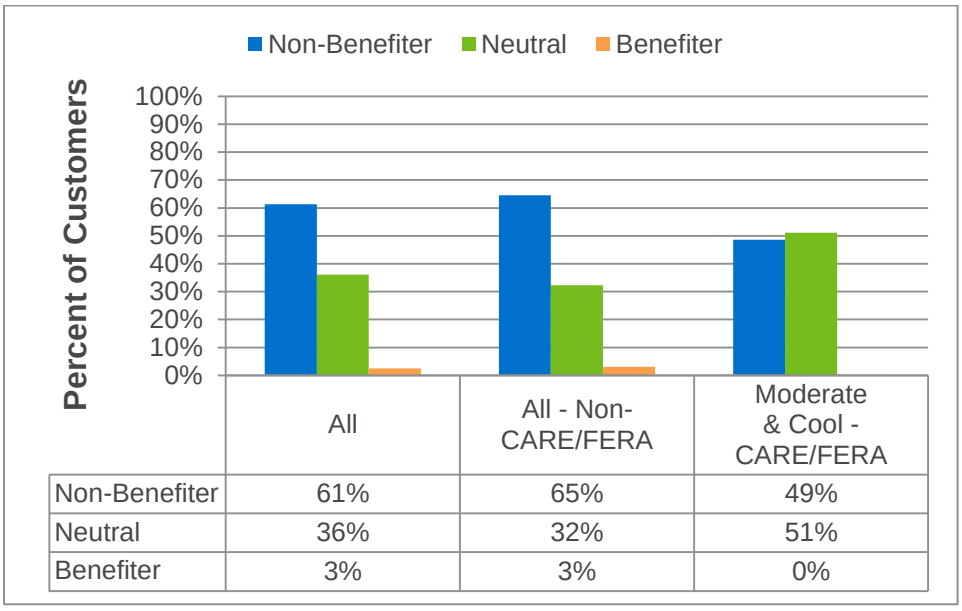


	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Non-Benefiter	31%	34%	19%
Neutral	62%	57%	79%
Benefiter	7%	9%	1%

As seen in Figure 5-2, nearly all participating customers are either structural non-benefiters or in the neutral category in summer. Over 60% of customers in the non-CARE/FERA segment are non-benefiters, while about 50% of CARE/FERA customers in the moderate and cool climate regions are non-benefiters and 50% are neutral.

[12] The percentage values in the tables may not add up to 100% due to rounding in this and the following figures.

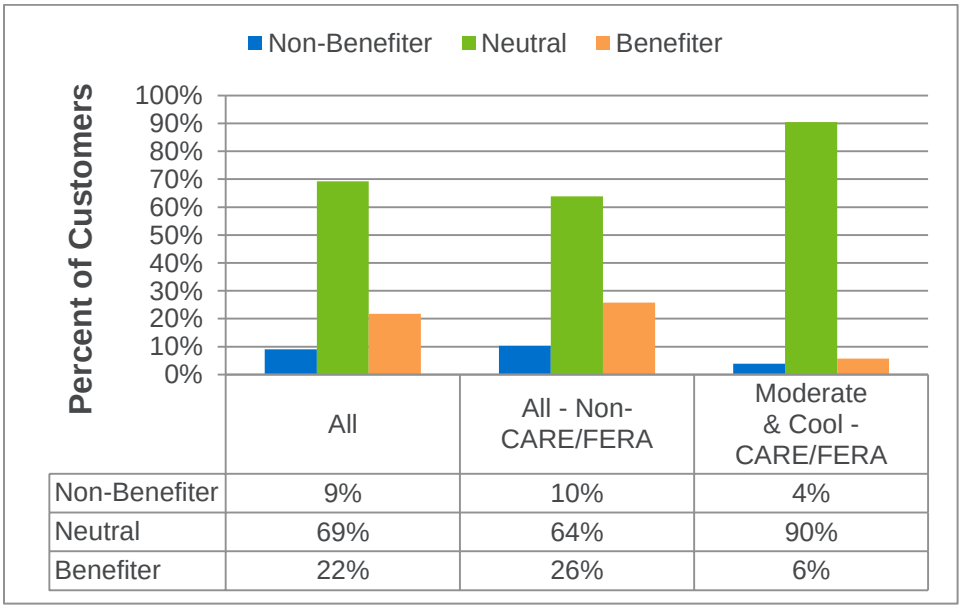
Figure 5-2: Rate 4 – Summer Structural Benefiter / Non-Benefiter Analysis by CARE/FERA Status



	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Non-Benefiter	61%	65%	49%
Neutral	36%	32%	51%
Benefiter	3%	3%	0%

The winter season had the highest rates of neutral customers as well as structural benefiters. About 26% of non-CARE/FERA customers are structural benefiters in the winter season. About 90% of CARE/FERA customers are neutral during the same time period. Across the three time periods, a slightly higher proportion of CARE/FERA customers are structural non-benefiters than non-CARE/FERA customers.

Figure 5-3: Rate 4 – Winter Structural Benefiter / Non-Benefiter Analysis by CARE/FERA Status



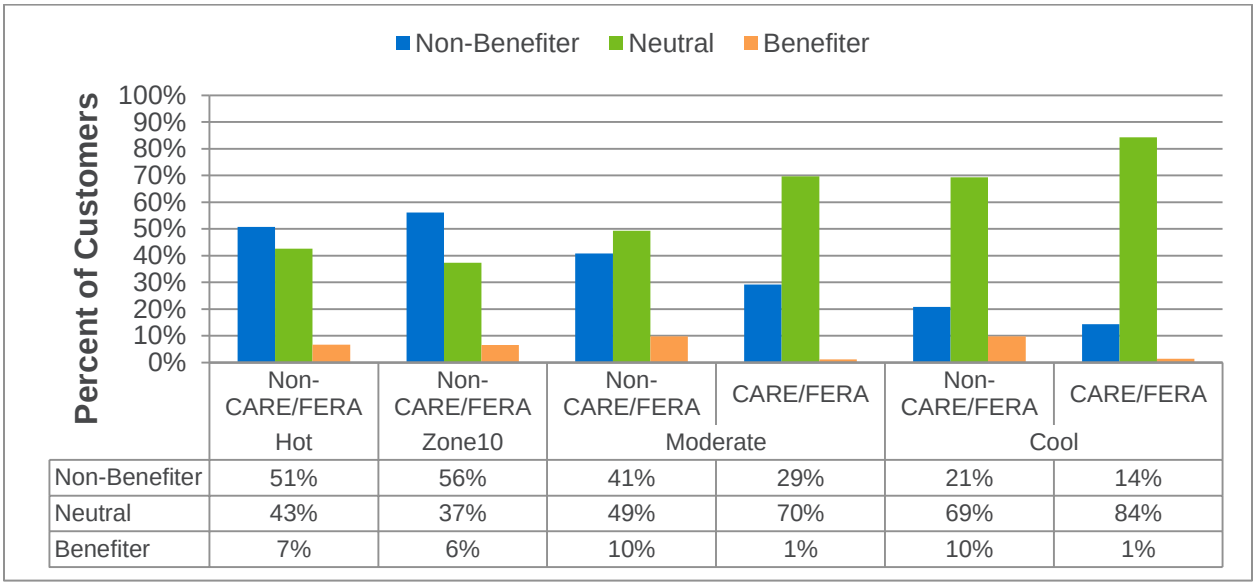
	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Non-Benefiter	9%	10%	4%
Neutral	69%	64%	90%
Benefiter	22%	26%	6%

Figure 5-4, Figure 5-5, and Figure 5-6 present the outcomes of the structural benefiter analysis for the Rate 4 CARE/FERA status level by climate regions for the annual, summer, and winter

time periods, respectively. The findings are consistent with the aggregate results as nearly all customers are structural non-benefiters or neutral in the summer season for every climate region. The CARE/FERA group also had fewer non-benefiters and more participants in the neutral category compared to non-CARE/FERA in the moderate and cool climate regions throughout the year.

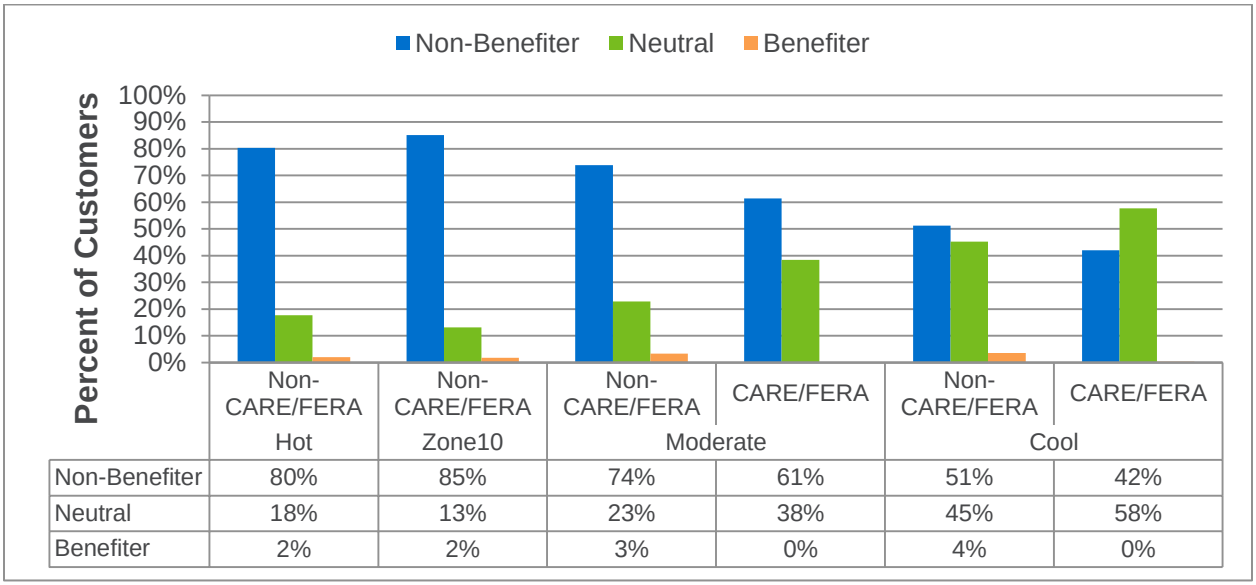
The proportion of structural non-benefiters increases as the climate regions move from cool to hot and Climate Zone 10 as seen in the annual and summer season (Figure 5-4 and Figure 5-5). The hot region and Climate Zone 10 had the highest number of structural benefiters during the winter season as seen in Figure 5-6. The winter season for Rates 4 and 5 had three rate periods compared to the two rate periods for the summer season. Both Rates 4 and 5 had a super off-peak period during the day where the price was $16 ¢/kWh.

Figure 5-4: Rate 4 – Annual Structural Benefiter / Non-Benefiter Analysis by Climate Region & CARE/FERA Status



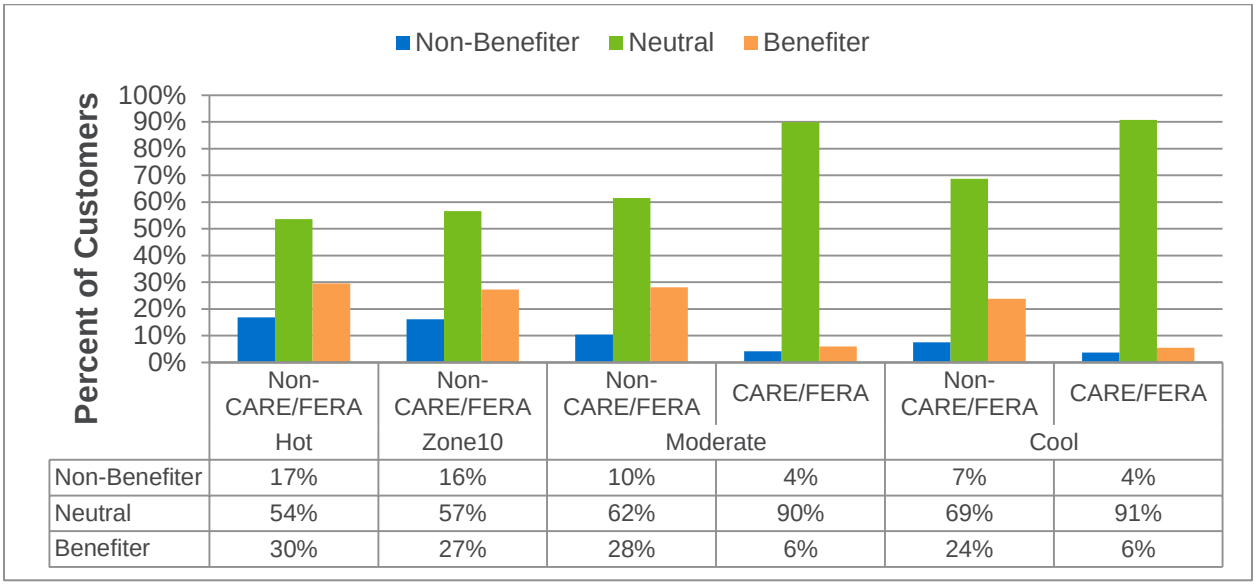
	Non-CARE/FERA	Non-CARE/FERA	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
	Hot	Zone10	Moderate		Cool	
Non-Benefiter	51%	56%	41%	29%	21%	14%
Neutral	43%	37%	49%	70%	69%	84%
Benefiter	7%	6%	10%	1%	10%	1%

Figure 5-5: Rate 4 – Summer Structural Benefiter / Non-Benefiter Analysis by Climate Region & CARE/FERA Status



	Non-CARE/FERA	Non-CARE/FERA	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
	Hot	Zone10	Moderate		Cool	
Non-Benefiter	80%	85%	74%	61%	51%	42%
Neutral	18%	13%	23%	38%	45%	58%
Benefiter	2%	2%	3%	0%	4%	0%

Figure 5-6: Rate 4 – Winter Structural Benefiter / Non-Benefiter Analysis by Climate Region & CARE/FERA Status



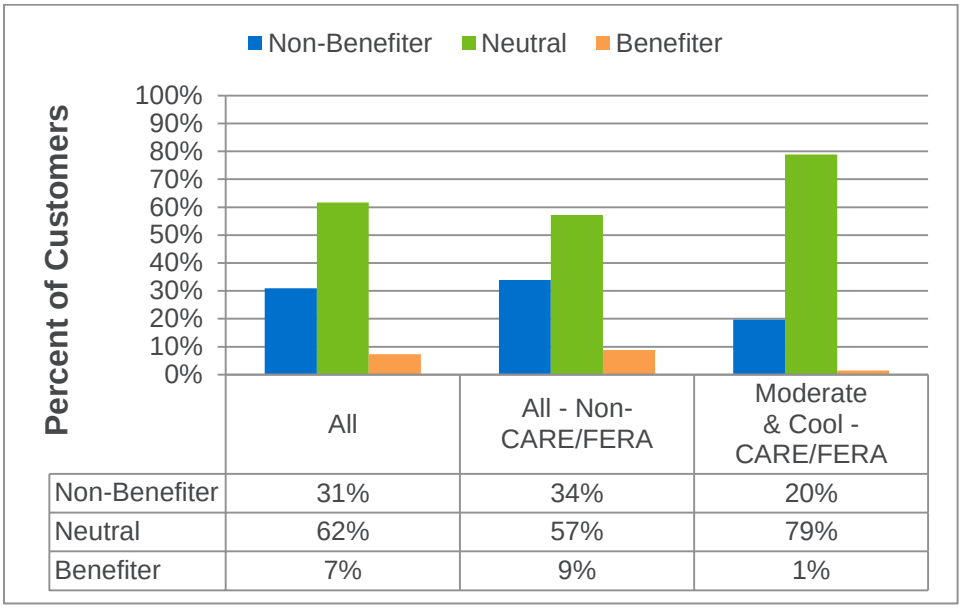
	Non-CARE/FERA	Non-CARE/FERA	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
	Hot	Zone10	Moderate		Cool	
Non-Benefiter	17%	16%	10%	4%	7%	4%
Neutral	54%	57%	62%	90%	69%	91%
Benefiter	30%	27%	28%	6%	24%	6%

5.2 Rate 5

Figure 5-7 presents the outcome of the annual structural benefiter analysis for Rate 5 at the aggregate level across climate regions while Figure 5-8 and Figure 5-9 contain the same data for the summer and winter seasons. SCE's Rate 5 differs from Rate 4 in several ways. Both rates have two rate periods on summer weekdays; however the Rate 5 peak period is only three hours, from 5 to 8 PM, compared to five hours on Rate 4. Additionally, the peak period price is greater on Rate 5 (47 ¢/kWh versus $40 ¢/kWh on Rate 4). In spite of these differences, overall, the general pattern of structural benefiters, non-benefiters, and neutrals is very similar between Rate 4 and Rate 5. Nearly all customers are structural non-benefiters in the summer season,

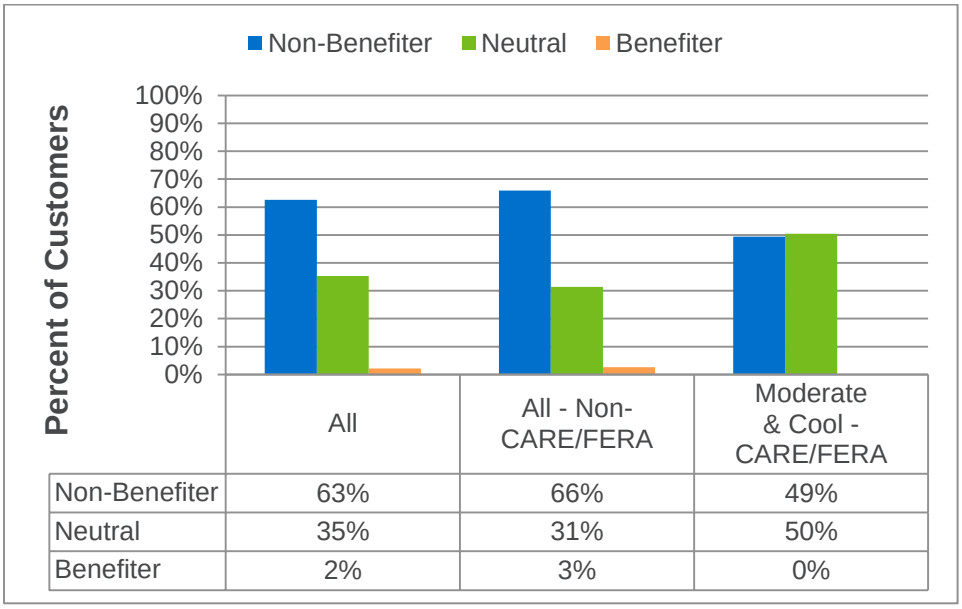
and there is a higher proportion of structural non-benefiters among non-CARE/FERA customers compared to CARE/FERA customers across the seasons and annually.

Figure 5-7: Rate 5 – Annual Structural Benefiter / Non-Benefiter Analysis by CARE/FERA Status



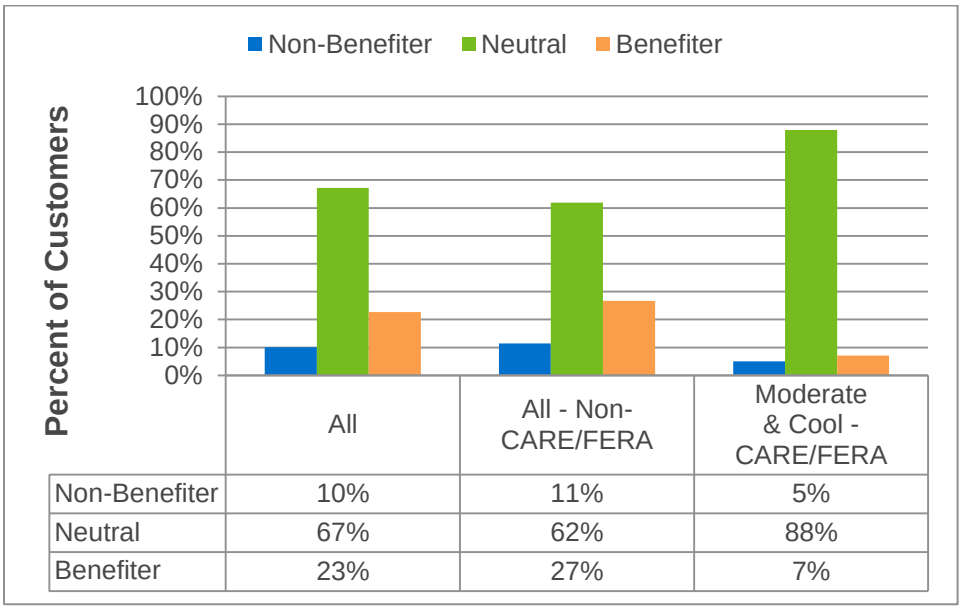
	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Non-Benefiter	31%	34%	20%
Neutral	62%	57%	79%
Benefiter	7%	9%	1%

Figure 5-8: Rate 5 – Summer Structural Benefiter / Non-Benefiter Analysis by CARE/FERA Status



	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Non-Benefiter	63%	66%	49%
Neutral	35%	31%	50%
Benefiter	2%	3%	0%

Figure 5-9: Rate 5 – Winter Structural Benefiter / Non-Benefiter Analysis by CARE/FERA Status

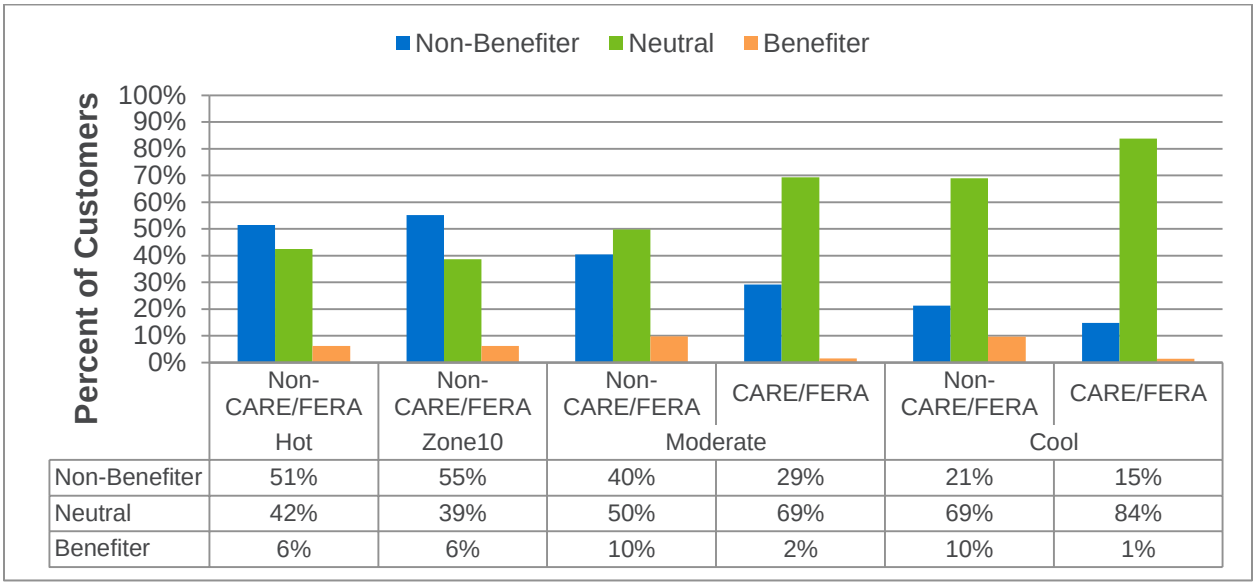


	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Non-Benefiter	10%	11%	5%
Neutral	67%	62%	88%
Benefiter	23%	27%	7%

Figure 5-10, Figure 5-11, and Figure 5-12 display the annual, summer and winter structural benefiter distributions for the CARE/FERA and non-CARE/FERA groups across the different climate regions. Overall, the distributions of structural benefiters and non-benefiters for the Rate 5 climate regions are similar to the estimates found for Rate 4.

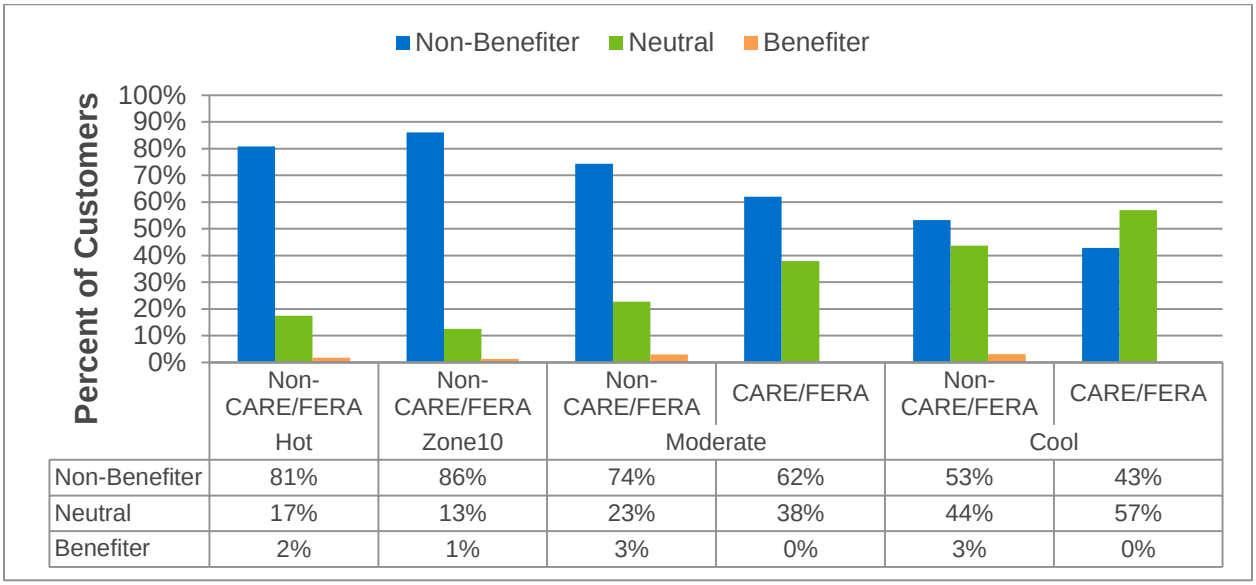
The CARE/FERA group also had fewer non-benefiters and more participants in the neutral category compared to non-CARE/FERA in the moderate and cool climate regions throughout the year. The hot and Climate Zone 10 regions have larger proportions of non-benefiters at the summer and annual levels compared to the cool and moderate climate regions. The hottest regions also have the largest number of benefiters during the winter months.

Figure 5-10: Rate 5 – Annual Structural Benefiter / Non-Benefiter Analysis by Climate Region & CARE/FERA Status



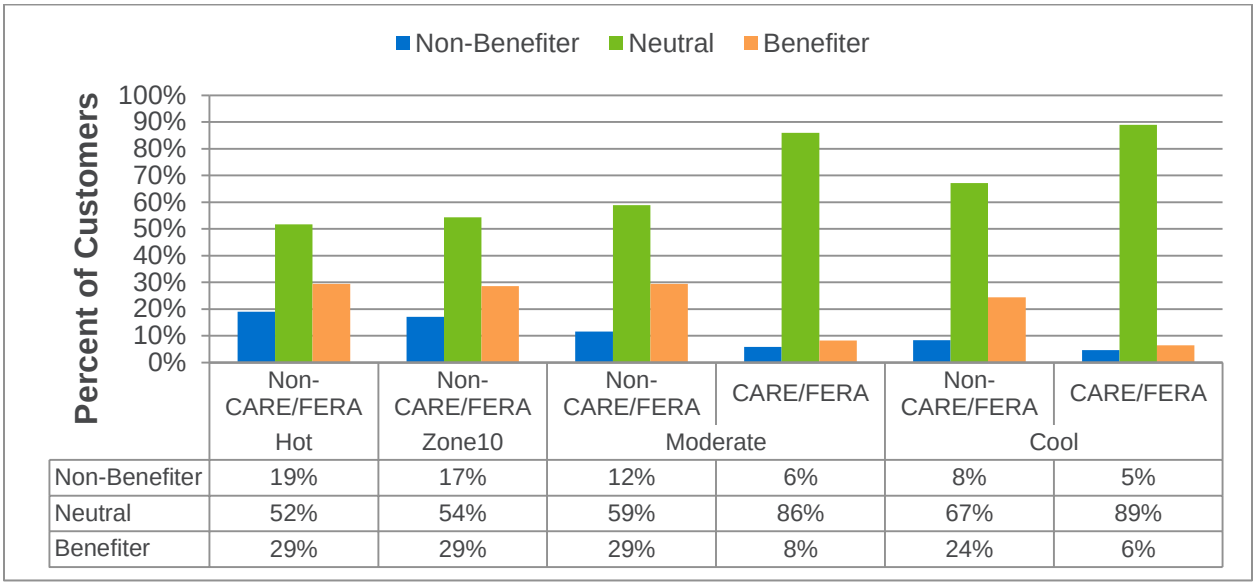
	Hot		Moderate		Cool	
	Non-CARE/FERA	Non-CARE/FERA	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
Non-Benefiter	51%	55%	40%	29%	21%	15%
Neutral	42%	39%	50%	69%	69%	84%
Benefiter	6%	6%	10%	2%	10%	1%

Figure 5-11: Rate 5 – Summer Structural Benefiter / Non-Benefiter Analysis by Climate Region & CARE/FERA Status



	Hot		Moderate		Cool	
	Non-CARE/FERA	Non-CARE/FERA	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
Non-Benefiter	81%	86%	74%	62%	53%	43%
Neutral	17%	13%	23%	38%	44%	57%
Benefiter	2%	1%	3%	0%	3%	0%

Figure 5-12: Rate 5 – Winter Structural Benefiter / Non-Benefiter Analysis by Climate Region & CARE/FERA Status

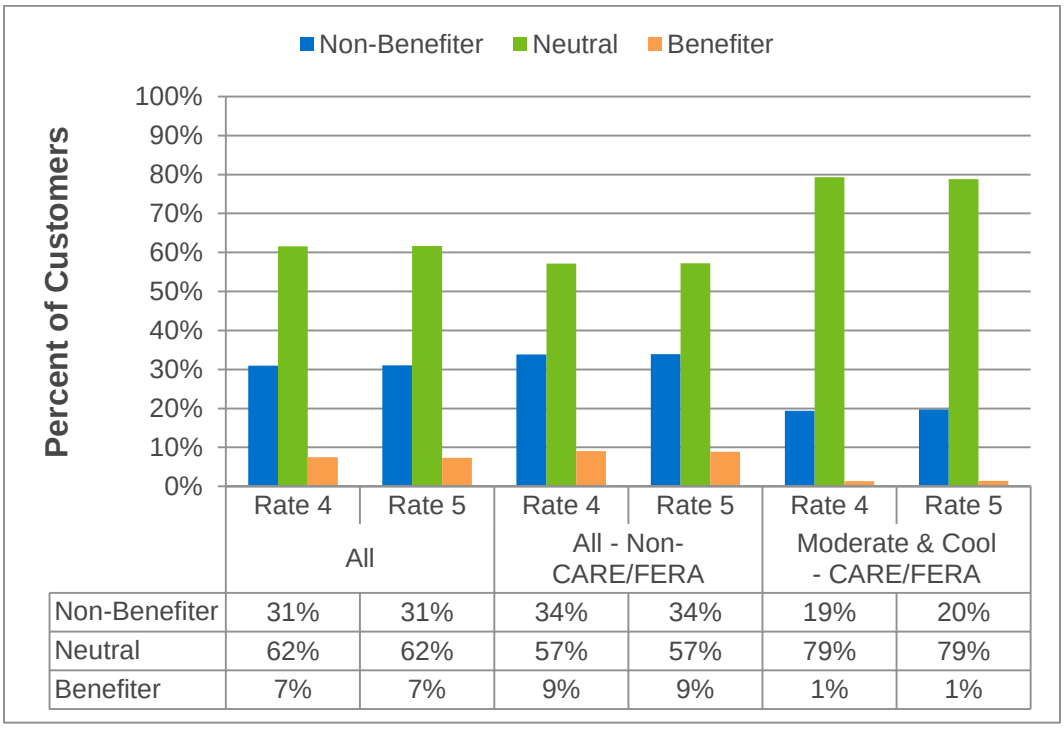


	Non-CARE/FERA	Non-CARE/FERA	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
	Hot	Zone10	Moderate		Cool	
Non-Benefiter	19%	17%	12%	6%	8%	5%
Neutral	52%	54%	59%	86%	67%	89%
Benefiter	29%	29%	29%	8%	24%	6%

5.3 Comparison Across Rates

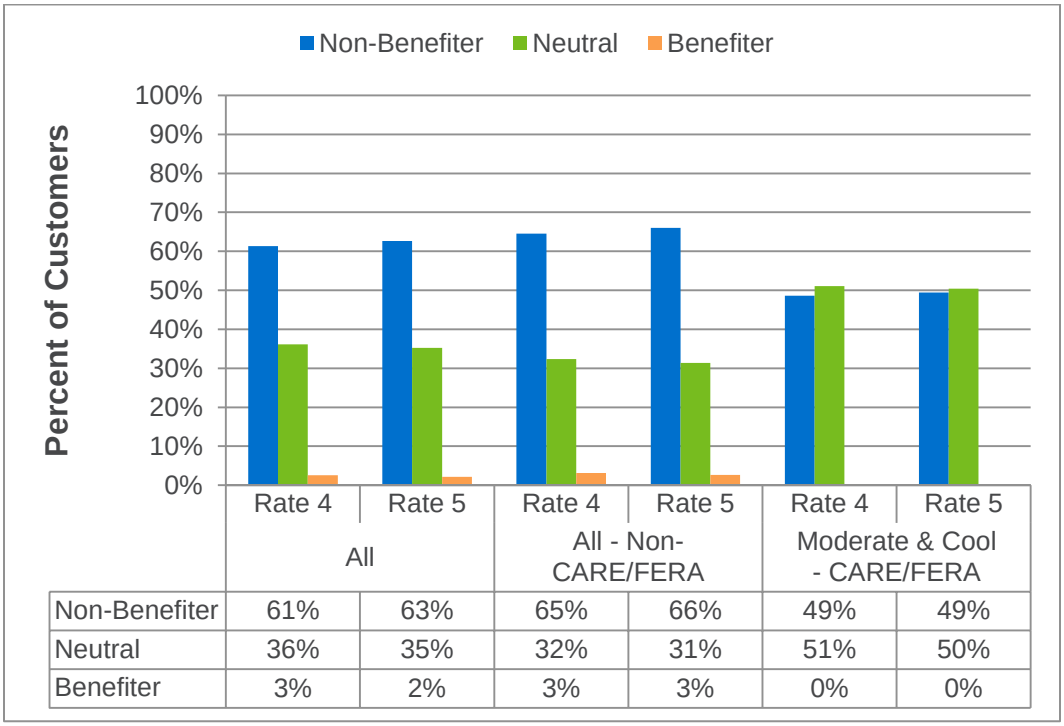
Figure 5-13, Figure 5-14, and Figure 5-15 present the results of the structural bill impact analysis for each rate side-by-side. The two rates have very similar distributions of benefiters, non-benefiters, and neutral customers.

Figure 5-13: Annual Structural Benefiter / Non-Benefiter Analysis by Rate



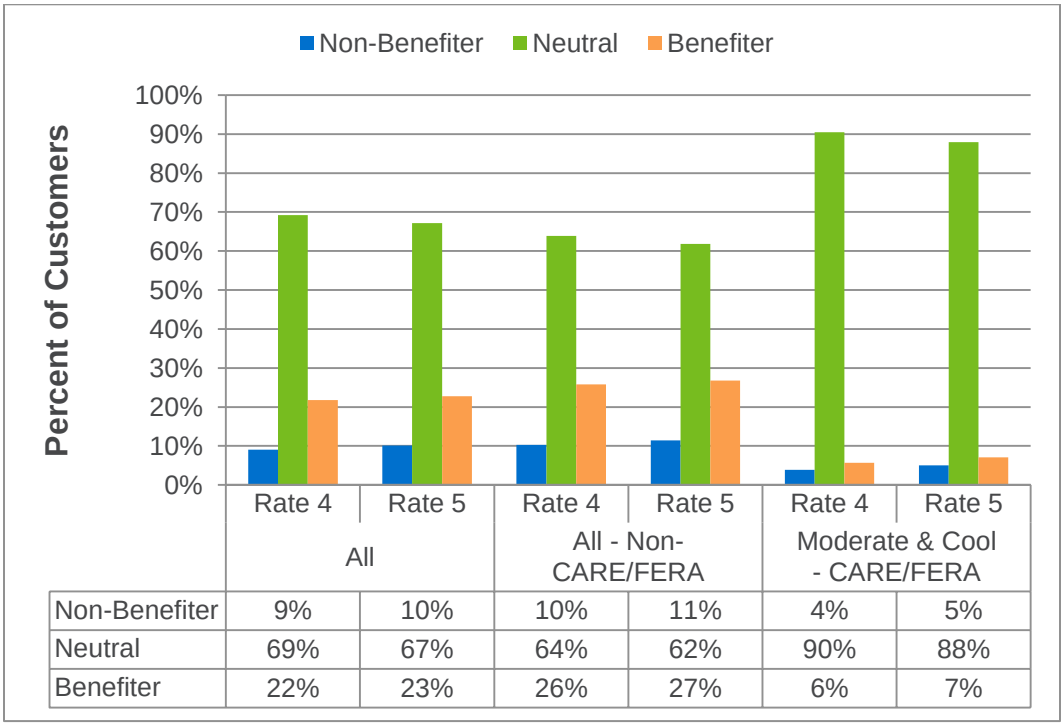
	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5
	All		All - Non-CARE/FERA		Moderate & Cool - CARE/FERA	
Non-Benefiter	31%	31%	34%	34%	19%	20%
Neutral	62%	62%	57%	57%	79%	79%
Benefiter	7%	7%	9%	9%	1%	1%

Figure 5-14: Summer Structural Benefiter / Non-Benefiter Analysis by Rate



	All		All - Non-CARE/FERA		Moderate & Cool - CARE/FERA	
	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5
Non-Benefiter	61%	63%	65%	66%	49%	49%
Neutral	36%	35%	32%	31%	51%	50%
Benefiter	3%	2%	3%	3%	0%	0%

Figure 5-15: Winter Structural Benefiter / Non-Benefiter Analysis by Rate



	All		All - Non-CARE/FERA		Moderate & Cool - CARE/FERA	
	Rate 4	Rate 5	Rate 4	Rate 5	Rate 4	Rate 5
Non-Benefiter	9%	10%	10%	11%	4%	5%
Neutral	69%	67%	64%	62%	90%	88%
Benefiter	22%	23%	26%	27%	6%	7%

6 Customer Attrition

This section summarizes customer attrition and opt-out rates for each rate and informational treatment tested by SCE. As discussed in Section 3.3, an analysis of customer opt-out rates can provide useful insights concerning relative customer preferences among the rates. Comparing opt-out rates across notification treatment options reveals whether seasonal or monthly bill impact information or alternative messaging impacts customer acceptance of the rate offer. Findings for these and related metrics are discussed in this section, which is organized around pre- and post-enrollment periods.

6.1 Pre-enrollment Opt-outs

During the pre-enrollment notification period, customers could take one of the following actions:

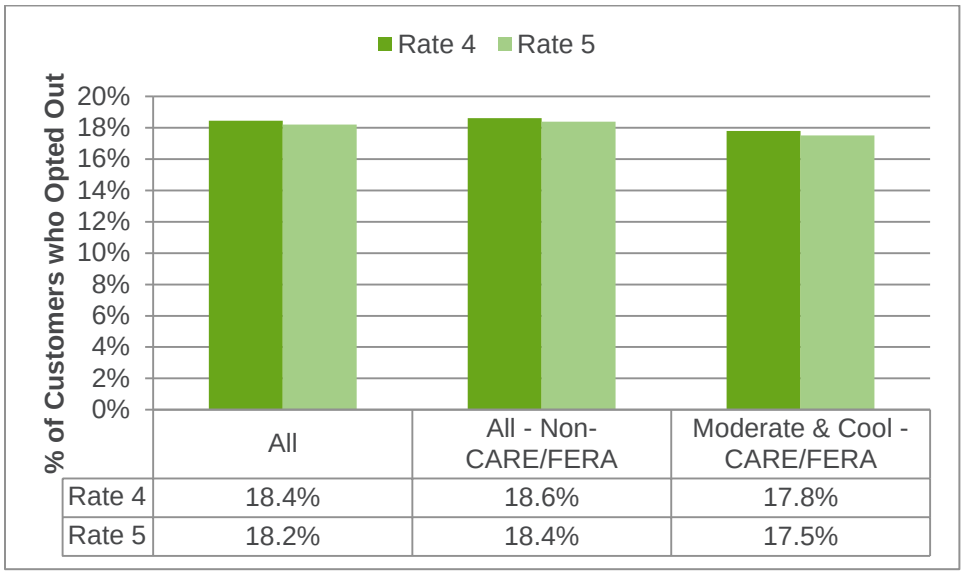
- Opt out to their OAT;
- Select a different TOU rate option than the one they were scheduled to be defaulted onto (including switching from Rate 4 to Rate 5 or vice versa);
- Do nothing, which would enroll them on the default rate that was offered to them.

As discussed in Section 3, these decisions can be examined using pairwise comparisons across rates and other treatment options. Pairwise comparisons are discussed in Section 6.1.1.

6.1.1 Pairwise Comparisons

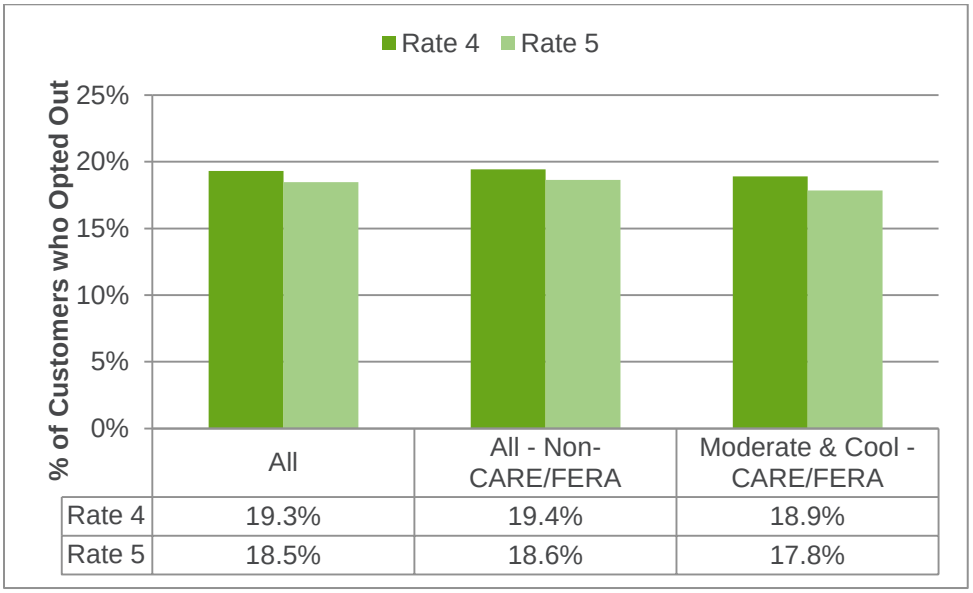
Figure 6-1 shows the percent of customers who chose to remain on the OAT for each rate option and customer segment. As seen, for this metric, there is very little difference in opt-out rates between Rates 4 and 5. For the service territory as a whole, the opt-out rate for Rate 4 was 18.4% and the value for Rate 5 was 18.2%. The observed difference between the two is not statistically significant. The difference in opt-out rates for CARE/FERA and non-CARE/FERA customers are similarly small and not statistically significant. Using this metric, there does not appear to be a preference for one rate over the other. However, Figure 6-2 tells a somewhat different story about customer preferences. The opt-out rates in this figure include customers who rejected the default rate option in favor of either the OAT or the alternative TOU rate. Using this metric, more customers rejected Rate 4 than Rate 5. While the difference in these opt-out rates was relatively small, the one percentage point difference equals roughly a 5% difference in opt-out rates across two Rate options and it is statistically significant for all three groups shown in Figure 6-2.

Figure 6-1: Pre-Enrollment Opt-Out Rates by CARE/FERA Status (Customers Choosing the OAT Rather than the Default Rate)



	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Rate 4	18.4%	18.6%	17.8%
Rate 5	18.2%	18.4%	17.5%

Figure 6-2: Pre-Enrollment Opt-Out Rates by CARE/FERA Status (Customers Choosing the OAT or an Alternative TOU Rate Rather than the Default Rate)

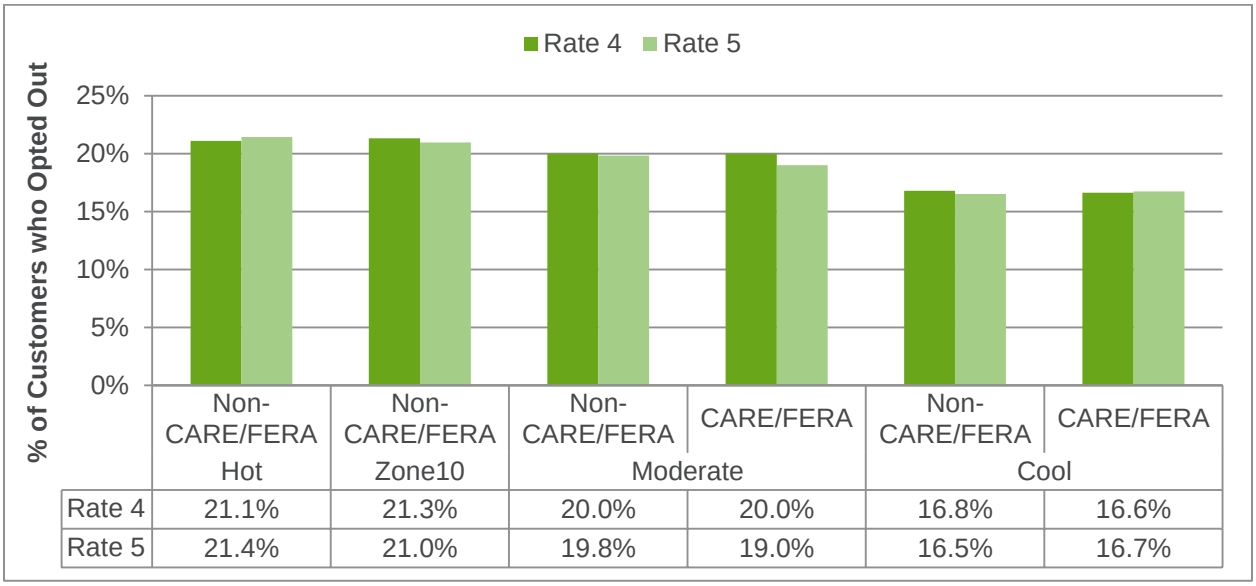


	All	All - Non-CARE/FERA	Moderate & Cool - CARE/FERA
Rate 4	19.3%	19.4%	18.9%
Rate 5	18.5%	18.6%	17.8%

Figure 6-3 and Figure 6-4 show the pre-enrollment opt-out rates by default pilot rate, climate region, and CARE/FERA status for the two types of opt-out actions (e.g., opt out to the OAT or opt out to the OAT plus the alternative TOU rate). As seen, opt-out rates are lowest in the cool climate region and highest in the two hot regions under both definitions of opt-out. For non-CARE/FERA customers, there is nearly a five percentage point difference, or a difference of almost 30%, in opt-out rates between the cool zone and the two hot climate regions for both rates using the OAT opt-out definition. Using the other opt-out definition, the difference across regions was slightly less but still quite significant. Given that customers in the hot regions are more likely to see bill increases on the TOU rate compared to the OAT than are customers in

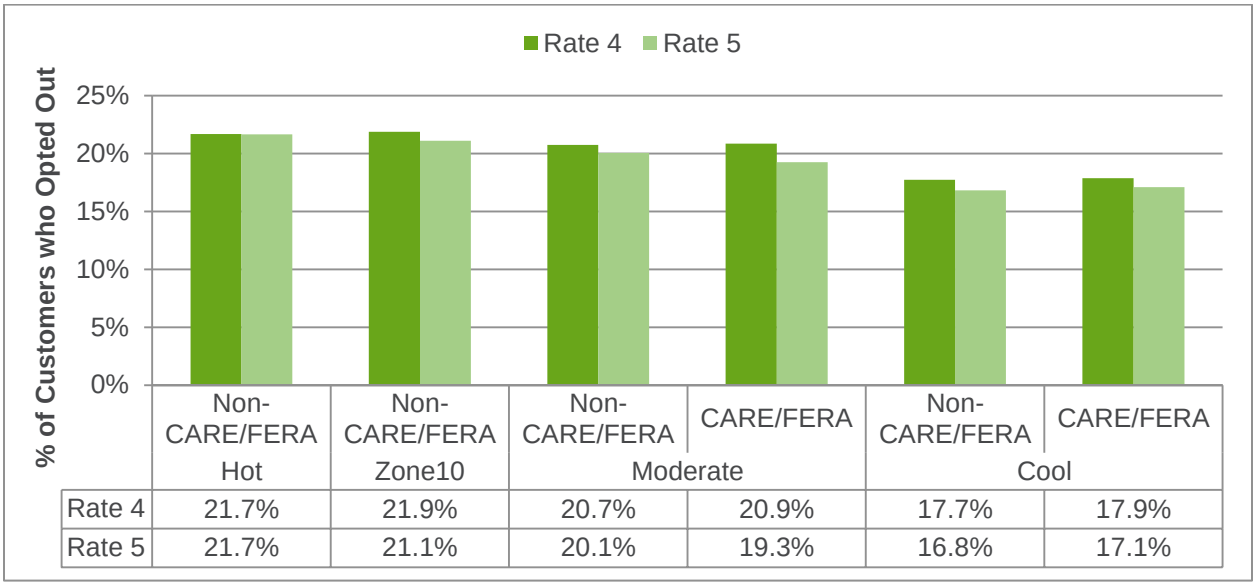
the cool region, it would appear that the structural bill comparison information provided as part of the notifications was read by many and had the intended effect of alerting customers in the hotter regions that the new rate could lead to bill increases.

Figure 6-3: Pre-Enrollment Opt-Out Rates by Climate Region and CARE/FERA Status (Customers Choosing the OAT Rather than the Default Rate)



	Hot		Moderate		Cool	
	Non-CARE/FERA	Non-CARE/FERA Zone10	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
Rate 4	21.1%	21.3%	20.0%	20.0%	16.8%	16.6%
Rate 5	21.4%	21.0%	19.8%	19.0%	16.5%	16.7%

Figure 6-4: Pre-Enrollment Opt-Out Rates by Climate Region and CARE/FERA Status (Customers Choosing the OAT or an Alternative TOU Rate Rather than the Default Rate)



	Hot		Moderate		Cool	
	Non-CARE/FERA	Non-CARE/FERA Zone10	Non-CARE/FERA	CARE/FERA	Non-CARE/FERA	CARE/FERA
Rate 4	21.7%	21.9%	20.7%	20.9%	17.7%	17.9%
Rate 5	21.7%	21.1%	20.1%	19.3%	16.8%	17.1%

Another important question is whether the granularity of the structural bill information provided or the type of messaging had a material impact on opt-out rates. Table 6-1summarizes the eight different notification treatment cells that were tested in the pilot. The cells differ with respect to the default rate offered (Rate 4 or Rate 5), the granularity of the bill comparisons presented

(monthly or seasonal), and the messaging type (loss aversion versus opportunity to save). Each cell contained approximately 50,000 customers.

Table 6-1: Default Notification Cells

Notification Cell	Rate	Rate Comparison	Messaging
1	4	Monthly	Loss Aversion
2			Opportunity to Save
3		Seasonal	Loss Aversion
4			Opportunity to Save
5	5	Monthly	Loss Aversion
6			Opportunity to Save
7		Seasonal	Loss Aversion
8			Opportunity to Save

Table 6-2 and the following two tables report statistics for three types of actions. The column labeled “Chose Alternate TOU Rate” refers to customers offered Rate 4 who chose Rate 5 or who were offered Rate 5 and chose Rate 4. The column labeled “Opted Out” refers to customers who did not accept either the rate offered or the alternative pilot rate. Finally, to answer the question “How many customers did not accept the rate they were offered?” the percentages reported in the previous two columns can be added together. Those percentages are shown in the final two columns labeled “Opted Out of Default Rate.” Cells shaded in gray indicated that there is not a statistically significant different between treatment cells at the 90% confidence level (a p-value greater than 0.100)

Table 6-2 shows the difference in opt-out rates between two messages included in default pilot notification materials. Customers presented with a loss aversion message were slightly more likely to opt out compared to customers receiving a message framing TOU as an opportunity to save money on their electricity bills. This result occurred for both opt-out definitions. The difference was statistically significant for most comparisons. For example, about 18.8% customers in the “loss aversion” cells opted out to the OAT while 17.9% in the “opportunity” cells opted out to the OAT. The p-value for these t-tests was less than 0.100, indicating that the difference is statistically significant.

Table 6-2: Effect of Messaging on Pre-enrollment Opt-outs (Loss Aversion vs. Opportunity to Save)

Comparison	Notification Cell	Messaging	Treatment Customers	Chose Alternate TOU Rate		Opted Out to OAT		Opted Out of Default Rate	
				%	P-value	%	P-value	%	P-value
1 vs. 2	1	Loss Aversion	49,998	1.0%	0.012	18.9%	0.004	19.9%	0.001
	2	Opportunity	49,999	0.8%		18.2%		19.0%	
3 vs. 4	3	Loss Aversion	50,000	0.9%	0.339	18.9%	0.000	19.8%	0.000
	4	Opportunity	50,000	0.8%		17.7%		18.6%	
5 vs. 6	5	Loss Aversion	50,000	0.3%	0.470	18.7%	0.000	19.0%	0.000
	6	Opportunity	49,998	0.3%		17.8%		18.0%	
7 vs. 8	7	Loss Aversion	50,000	0.3%	0.047	18.6%	0.000	18.9%	0.000
	8	Opportunity	49,999	0.2%		17.7%		18.0%	

* A shaded cell indicates estimate is not statistically significant

Table 6-3 compares pre-enrollment opt-out rates for customers who received monthly rate comparisons and those who received a seasonal rate comparison in their default notification materials. In all instances, the differences in opt-out rates were very small and were not statistically significant except for one instance (the “opportunity message” for Rate 4). These results indicate that the granularity of rate comparisons did not affect the pre-enrollment opt-out rates.

Table 6-3: Effect of Granularity of Rate Comparison Information on Pre-enrollment Opt-outs (Monthly vs. Seasonal)

Comparison	Notification Cell	Granularity of Rate Comparison	Treatment Customers	Chose Alternate TOU Rate		Opted Out to OAT		Opted Out of Default Rate	
				%	P-value	%	P-value	%	P-value
1 vs. 3	1	Monthly	49,998	1.0%	0.321	18.9%	0.977	19.9%	0.834
	3	Seasonal	50,000	0.9%		18.9%		19.8%	
2 vs. 4	2	Monthly	49,999	0.8%	0.575	18.2%	0.044	19.0%	0.063
	4	Seasonal	50,000	0.8%		17.7%		18.6%	
5 vs. 7	5	Monthly	50,000	0.3%	0.524	18.7%	0.703	19.0%	0.765
	7	Seasonal	50,000	0.3%		18.6%		18.9%	
6 vs. 8	6	Monthly	49,998	0.3%	0.530	17.8%	0.828	18.0%	0.772
	8	Seasonal	49,999	0.2%		17.7%		18.0%	

* A shaded cell indicates estimate is not statistically significant

Finally, Table 6-4 shows the difference in opt-out rates between customers offered Rate 4 and Rate 5 for each of the notification treatment options. Each pairwise comparison holds differences in notification options constant and compares the opt-out rates for each tariff. As

discussed above, based on the opt-out definition structured around the OAT, there is very little difference between the values for each rate. However, when switching from the default rate to the alternative rate is factored into the definition, there are statistically significant differences with the opt-out rate for Rate 4 being higher than for Rate 5. This is because many more customers offered Rate 4 chose Rate 5 than vice versa, as seen in the column labeled "Chose Alternate TOU Rate." The percent of customers who were offered Rate 4 but chose the alternate rate was about 0.9% while the percent of customers who were offered Rate 5 and chose the alternate rate was closer to 0.3%. Although the peak period price is greater on Rate 5, the peak period is shorter, which may appeal to customers. This difference was statistically significant in each pairwise comparison presented in the table below.

Table 6-4: Effect of Rate Offered on Pre-enrollment Opt-outs

Comparison	Notification Cell	Rate	Treatment Customers	Chose Alternate TOU Rate		Opted Out to OAT		Opted Out of Default Rate	
				%	P-value	%	P-value	%	P-value
1 vs. 5	1	Rate 4	49,998	1.0%	0.000	18.9%	0.389	19.9%	0.000
	5	Rate 5	50,000	0.3%		18.7%		19.0%	
2 vs. 6	2	Rate 4	49,999	0.8%	0.000	18.2%	0.078	19.0%	0.000
	6	Rate 5	49,998	0.3%		17.8%		18.0%	
3 vs. 7	3	Rate 4	50,000	0.9%	0.000	18.9%	0.204	19.8%	0.000
	7	Rate 5	50,000	0.3%		18.6%		18.9%	
4 vs. 8	4	Rate 4	50,000	0.8%	0.000	17.7%	0.972	18.6%	0.017
	8	Rate 5	49,999	0.2%		17.7%		18.0%	

* A shaded cell indicates estimate is not statistically significant

6.2 Post-enrollment Opt-Outs

Post-enrollment opt-out rates were very small during the period following enrollment through the end of the summer (September 2018). Cumulative opt-out rates are presented for the post-enrollment period for each climate region and CARE/FERA status in Figure 6-5, Figure 6-6, and Figure 6-7. Generally any difference in cumulative opt-out rates between segments occurred during the pre-treatment period. Post-enrollment opt-out rates for all customer segments were between 0.7% and 1.0%. Post enrollment opt-out rates are lowest in the cool climate region and highest in the hot region. Within the moderate climate region, Rate 5 customers show a slightly lower opt-out rate than Rate 4 customers.

Figure 6-5: Cumulative Opt-Out Rates for Hot and Zone 10 Climate Regions[13]

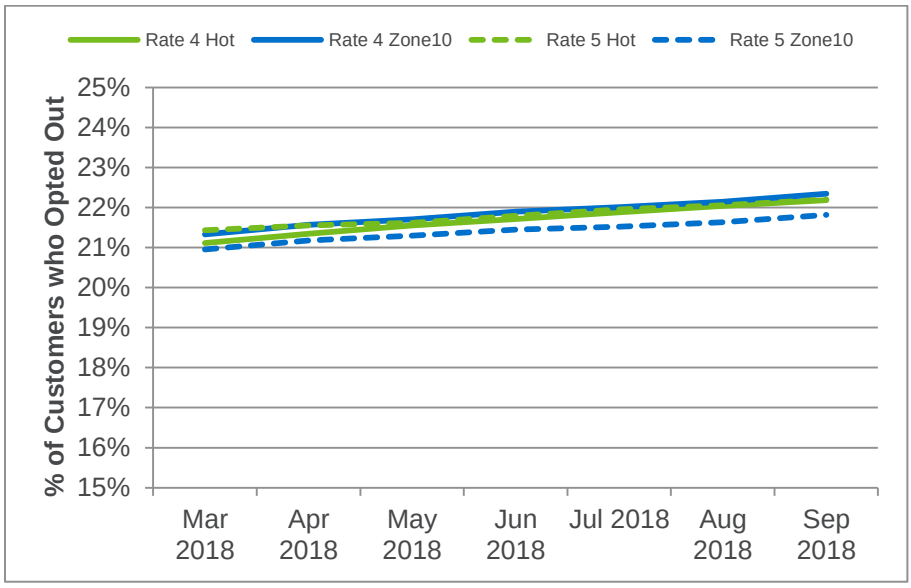
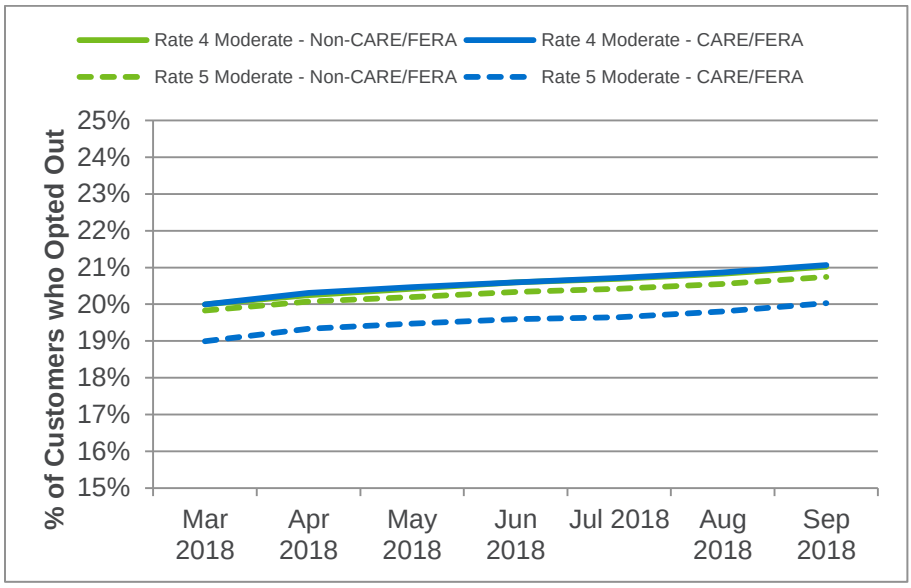
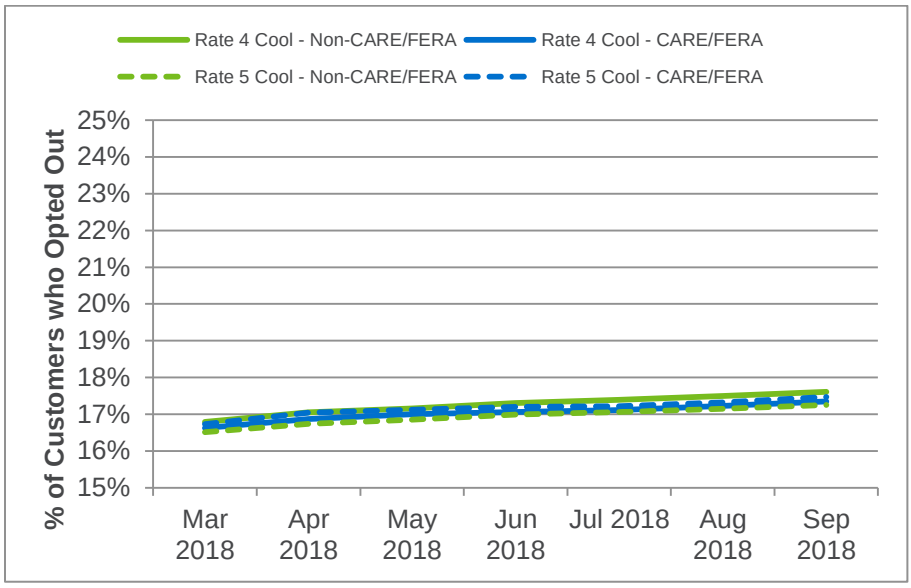


Figure 6-6: Cumulative Opt-Out Rates for Moderate Climate Region



[13] Opt-out rates here present customers who opted out to the OAT, not those who opted out into the alternate rate.

Figure 6-7: Cumulative Opt-Out Rates for Cool Climate Region



Also of interest are post-enrollment opt-out rates by aftercare treatment cell. Table 6-5 summarizes the various treatments that were examined after customers enrolled on the new TOU rates and the sample sizes for each treatment group.

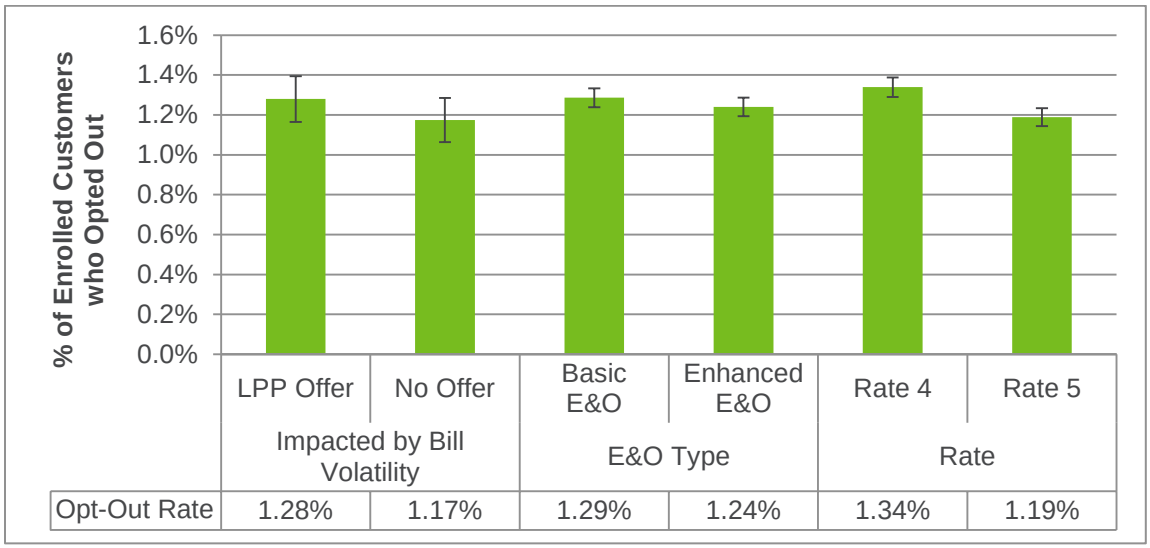
The enrolled population on each of the default rates was divided equally into those slated to receive basic or enhanced welcome packets and ongoing education and outreach (E&O) communication and then segmented further into two groups, those deemed to be most impacted by bill volatility and those who are not. The segment of customers impacted by bill volatility was considered to be income-constrained customers who experience increased seasonal bill differentials under the default TOU rate. As seen in Table 6-5, this segment of customers is further divided into two equal groups, with one group receiving information on SCE's Level Payment Plan (LPP) as a means of managing month-to-month bill volatility.

Table 6-5: Post-Enrollment Treatments

Aftercare Cell	Rate	Communication	Impacted by Bill Volatility	LPP Promotion	Sample Size
1	4	Enhanced E&O	Impacted by Bill Volatility	LPP Promotion	6,448
2				No Promotion	6,448
3			Not Impacted	No Promotion	64,245
4		Basic E&O	Impacted by Bill Volatility	LPP Promotion	6,420
5				No Promotion	6,418
6			Not Impacted	No Promotion	64,245
7	5	Enhanced E&O	Impacted by Bill Volatility	LPP Promotion	6,646
8				No Promotion	6,644
9			Not Impacted	No Promotion	65,311
10		Basic E&O	Impacted by Bill Volatility	LPP Promotion	6,705
11				No Promotion	6,703
12			Not Impacted	No Promotion	65,195

Figure 6-8 shows cumulative post-enrollment opt-out rates for the various aftercare treatment cells and Table 6-6 shows similar information along with the results of a series of t-tests. Cells highlighted in gray indicate that the difference in opt-out rates within that comparison is not statistically significant. While the opt-out rate for customers impacted by bill volatility who received the LPP offer is greater than the rate for those who did not, this difference is not statistically significant at the 90% confidence level for both rates combined and separately. The same is true between customers who received the basic E&O versus those who received the enhanced E&O. The only statistically significant difference in opt-out rates occurred between Rate 4 and Rate 5. However, the actual percentage point difference is incredibly small (1.34% versus 1.19%).

Figure 6-8: Cumulative Post-Enrollment Opt-Out Rates by Aftercare Treatment



	LPP Offer	No Offer	Basic E&O	Enhanced E&O	Rate 4	Rate 5
	Impacted by Bill Volatility		E&O Type		Rate	
Opt-Out Rate	1.28%	1.17%	1.29%	1.24%	1.34%	1.19%

Table 6-6: Cumulative Post-Enrollment Opt-Out Rates by Aftercare Treatment

Rate	Comparison	Aftercare Treatment	Number of Customers	Post-enrollment Opt-Out Rate[14]	P-Value
Both Rates	Impacted by Bill Volatility	LPP Offer	25,790	1.28%[15]	0.276
		No Offer	25,726	1.17%	
	E&O Type	Basic E&O	153,363	1.29%	0.252
		Enhanced E&O	153,352	1.24%	
	Rate	Rate 4	152,432	1.34%	0.000
		Rate 5	154,283	1.19%	
Rate 4	Impacted by Bill Volatility	LPP Offer	12,722	1.30%	0.545
		No Offer	12,704	1.22%	
	E&O Type	Basic E&O	76,204	1.35%	0.767
		Enhanced E&O	76,228	1.33%	
Rate 5	Impacted by Bill Volatility	LPP Offer	13,068	1.25%	0.348
		No Offer	13,022	1.13%	
	E&O Type	Basic E&O	77,159	1.23%	0.176
		Enhanced E&O	77,124	1.15%	

* A shaded cell indicates estimate is not statistically significant

[14] An additional decimal point is included to avoid confusion that could result from rounding errors.

[15] Unlike the previous sections, these percentages are based on the enrolled population, not the notified population. This leads to higher opt-out rate estimates.

7 Key Findings

The first summer of SCE's default TOU pilot summarized above has produced a large amount of information that will help guide SCE's approach to implementation of default TOU pricing. However, it must be kept in mind that these load impact findings are based on only the summer months. Load impacts will differ significantly during winter months and the actions of TOU pilot participants may be quite different over the course of a full year.

Differences in load and bill impacts and opt-out rates across customer segments at the service territory level reflect not just differences across segments, but also differences in the mix of customers across climate regions. CARE/FERA customers in the hot climate region and Climate Zone 10 were not allowed to be enrolled on TOU tariffs using default recruitment. As such, comparisons across the two hot and two more moderate regions not only reflect differences in climate but also differences in the mix of customers. These differences must be kept in mind when making comparisons across segments and climate regions.

7.1 Load Impacts

Key findings pertaining to load impacts from the SCE pilots include:

- On average, default customers on both Rates 4 and 5 produced small but statistically significant, peak-period load reductions. Peak period load reductions averaged roughly 1.5% for Rate 4 and 2.0% for Rate 5.
- Load reductions for the common hours shared by the two rates (5 to 8 PM) were greater for Rate 5 than for Rate 4, likely because of the higher peak period price per kWh. It's also possible the shorter peak period of Rate 5 allowed for greater flexibility in customer response to the price signal. The difference was statistically significant for the territory as a whole, the moderate climate region, and Climate Zone 10.
- Statistically significant but small reductions in daily electricity use were found for both rates and in all climate regions. It appears that the average customer in SCE's service territory was more likely to reduce overall usage during the peak period rather than shift usage to off-peak hours.
- The pattern of load reductions across climate regions in absolute terms was consistent between the two rates but was slightly different in percentage terms. Absolute peak period load reductions were largest in Climate Zone 10 and the hot climate region regions, but these segments did not include CARE/FERA customers. Absolute impacts were smallest in the cool climate region, which included CARE/FERA and non-CARE/FERA customers.
- In the moderate and cool climate regions, non-CARE/FERA customers typically had statistically significantly greater peak period impacts compared to CARE/FERA customers. One exception was households in the moderate climate region on Rate 4, where the difference was not statistically significant. This finding is consistent with the opt-in TOU pilot.

- With one exception, the incremental peak period impact among households who received the Enhanced E&O treatment compared to households that did not was not statistically significant. In other words, the additional messaging did not increase peak period impacts. The exception was CARE/FERA customers in the moderate climate region who had an incremental increase in load impacts equal to about 0.6%.
- The offer to high bill volatility, low income customers to enroll on the Level Pay Plan as a way of managing volatility in bills across months and seasons was only taken up by a very small number of customers.

7.2 Structural Bill Impacts

Key findings pertaining to bill impacts include:

- Rate 4 and Rate 5 have very similar distributions of structural benefiters, non-benefiters, and customers in the neutral bill impact category of ±$3/month.
- A majority of customers are neither structural benefiters nor non-benefiters on an annual basis. Over 30% of non-CARE/FERA customers are structural non-benefiters while fewer than 20% of CARE/FERA customers fall into the same category. However, the CARE/FERA group does not include customers in the hot climate region where bill increases under the TOU rates are more likely to occur.
- Over 50% of customers in the hot climate region and Climate Zone 10 are structural non-benefiters on an annual basis. In the summer months, about 80% of customers in these regions are structural non benefiters while about 15% fall into the neutral category.
- Roughly 40% and 60% of CARE/FERA customers in the moderate and cool climate regions, respectively, are neither structural benefiters nor non-benefiters in the summer months.
- In the winter months, between 25% and 30% of non-CARE/FERA customers in all climate regions would save money on TOU rates. This outcome is expected because SCE's OAT is not seasonally differentiated. The TOU rates are seasonally differentiated with higher prices during the summer and lower prices during the winter.

7.3 Customer Attrition

Key findings pertaining to the opt-out analysis include:

- When the pre-enrollment opt-out decision is defined as selecting the OAT rather than the offered default rate, the difference in opt-out rates between Rates 4 and 5 were very small and not statistically significant. However, when the opt-out decision is defined as choosing either the OAT or the alternative TOU rate, the opt-out rate was about 5% higher (one percentage point) for Rate 4 than for Rate 5. This finding, along with the fact that more customers offered Rate 4 chose Rate 5 than vice versa, indicates that the average customer has a small but statistically significant preference for Rate 5 over Rate 4.
- Customers presented with loss aversion messaging were slightly more likely to opt out before enrollment compared to those who received messaging focused on an opportunity to save money on TOU. This difference was statistically significant.

- There was no difference in pre-enrollment opt-out rates between customers who received a monthly rate comparison and those who received a seasonal rate comparison. Though, it should be noted that a total annual bill comparison was also presented to both informational treatment groups.
- Post-enrollment opt-out rates were very small and fell between 0.7% and 1.0% for CARE/FERA and non-CARE/FERA customers in all climate regions. This indicates the vast majority of customers stay on the rate once they are enrolled on a TOU rate.
- Customers on Rate 4 were statistically significantly more likely to opt out post-enrollment. Again, it is possible the longer peak period was less desirable for some customers. However, the difference was very small (1.3% vs. 1.2%).

7.4 A Note About Comparing Default and Opt-in Results

If comparisons are made between results from this default pilot and the prior opt-in pilot, it is important to note a few important considerations:

- The first summer for the opt-in pilot covered July through September, while the default pilot estimates presented in this report include June through September. The omission of June, which is often a cooler month, from the opt-in pilot could affect the size of the impacts from the first summer.

- The peak period for Rate 1 in the opt-in pilot was from 2 PM to 8 PM whereas, the peak period for Rate 4 in the default pilot is from 4 PM to 9 PM. Rate 2 in the opt-in pilot has the same peak period hours, 5 PM to 8 PM, as Rate 5 in the default pilot.

- The peak period prices and price ratios also changed between the opt-in and default pilot. The summer peak period price for Rate 1 was $0.35 during the longer peak period under the opt-in pilot compared to $0.41 under the shorter peak period for Rate 4 in the default pilot. The peak to super-off-peak ratio for Rate 1 was 1.5:1 while the peak to off-peak ratio for Rate 4 is 1.8:1. The summer peak period price for Rate 2 in the opt-in pilot ($0.54 ¢/kWh) was higher than for Rate 5 in the default pilot ($0.49 ¢/kWh). The peak to super-off-peak ratio for Rate 2 was 3.1:1 while the peak to off-peak ratio for Rate 5 is 2.1:1.

- The opt-In pilot included CARE/FERA customers in each climate region whereas the default pilot does not include CARE/FERA customers in the hot climate zone or in Climate Zone 10.

- Climate Zone 10 was included in the Moderate climate region in the opt-in pilot.

In summary, the months included in the evaluation, peak period hours, prices, and inclusion of CARE/FERA customers all changed between the opt-in and default pilots. Therefore, the differences observed between the pilots are not solely a difference in customer response to opt-in versus default enrollment strategies.

Nexant

Headquarters

101 2nd Street, Suite 1000

San Francisco CA 94105-3651

Tel: (415) 369-1000

Fax: (415) 369-9700

www.nexant.com